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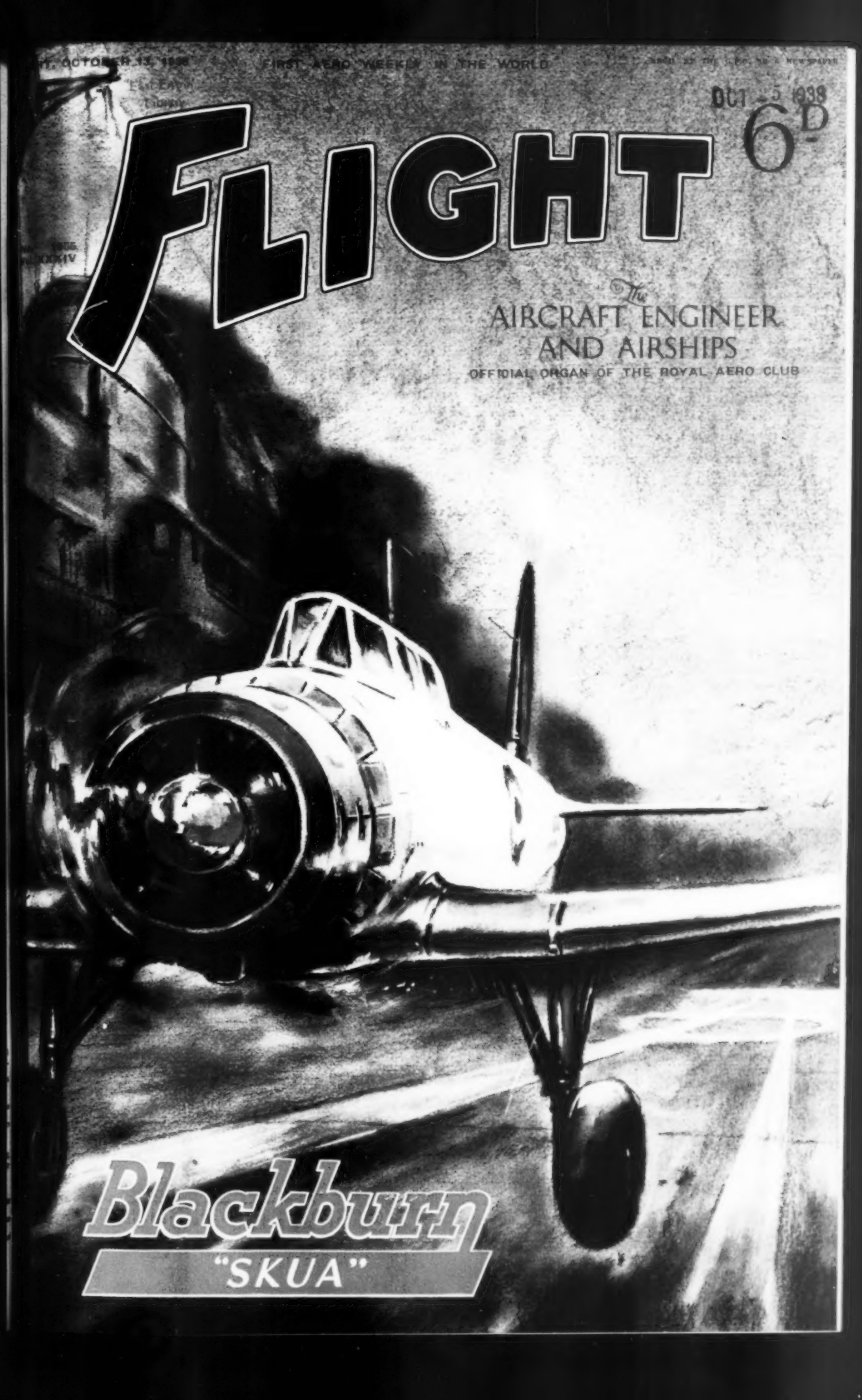
FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB



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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

A Great Flight

BY flying from Dundee to Orange River, the Short-Mayo *Mercury*, upper component of the composite aircraft, has demonstrated beyond any question the technical advantages of this form of assisted take-off. That the machine broke the existing world's record for seaplanes is of relatively minor importance, as is also the failure to beat the world's record for landplanes at present held by Russia.

What matters is that the separation at the much greater loaded weight of *Mercury* (27,500lb. instead of 20,800lb.) was carried out without a hitch, and that the whole of the equipment—aircraft engines, instruments and radio—functioned perfectly throughout. That ice formation during the early stages necessitated a descent to lower altitudes, followed by a fuel-consuming climb, and that head winds over certain parts of Africa slowed down the progress of the machine, was merely the luck of the game. It detracts no whit from the merits of the flight as a thorough test of the machine and its equipment.

When fitted with its small floats, *Mercury* has a range of about 1,500 miles after taking off under its own power. By loading it up with 2,130 gallons of petrol that range is quadrupled. That, therefore, is a measure of the increase in range made possible by composite take-off. And it may be remarked, incidentally, that this was the order of increase calculated by the designers before the machine was built.

Actual figures do not tell the whole of the story. From the operational point of view the great merit of composite launching is that the anxiety of the run during take-off, and the nerve strain of the first few hours of the unassisted take-off, when the machine is almost "tangent" (the height between the power-available and power-required curves is very small), are avoided. The same may, of course, be said of refuelling in the air, but not of catapult launching.

It is interesting to reflect that the Dornier Do.18 (Junkers diesels) on its flight from Start Bay to Caravellas, Brazil, covered 5,220 miles in 43 hours. *Mercury* covered, in about one hour less, more than 6,000 miles, using petrol engines. The consumption of the four Napier engines averaged about 50 gallons per hour, which must be regarded as remarkably low.

Concern in Australia

NEWS comes that Australia is considerably perturbed by the recent developments in Europe, and is looking askance at the Berlin-Rome-Tokyo axis. Concern can be understood, but surely no stronger feeling than that is justified. The British Navy is strong and is increasing in strength, and it seems incredible that it should not be able to guard all parts of the British Empire in the Far East without neglecting its duties in the North Sea and the Mediterranean. It can be remembered that in the recent crisis the one factor to which nobody gave any thought was the German fleet. Relations with Italy are steadily improving, and soon it may be hoped the Mediterranean will cause us no more anxiety than does the North Sea.

Australia is in a strong position, for, unless Japan wanted to conquer and annex part of her Northern Territory, there would seem no reason why Japan should attack Australia at all. An invasion across such a great distance of ocean would be a parlous affair, unless the Japanese control of the seas was overwhelming. A hostile landing is now judged to be an impossible military operation in the face of a strong defending air force, and as only an air force can hope to guard such a very long coastline as that of Australia the moral is obvious. It seems that Australia has already realised that, but much

water has flowed under Sydney Bridge in the few weeks since the special correspondent of *Flight* visited the Royal Australian Air Force. A further effort now seems to be called for.

Meantime news from New Zealand (published on page 319 of this issue) shows that the smaller Dominion is taking active steps to increase her Air Force. That is the way of sanity.

The Balloon Demonstration

THE display of barrage balloons over London last Saturday was not an exhibition of the defensive strength of the capital city but an appeal for recruits for the B.B. squadrons. Six hundred is the number of balloons considered desirable for London; the authorised establishment of the ten existing squadrons is 450, and on Saturday the number flown was about twenty-five. Of that total 20 per cent., i.e., five balloons, broke loose and their trailing cables did a certain amount of damage to chimney-pots and tiles, and in one case to an electric railway. Four of the runaways were speedily recaptured, but one went out to sea and finally sank near the coast of Denmark.

One of the problems before the Balloon Barrage Group is to find a cable which shall be as light as possible and yet have sufficient strength; for obviously, a balloon of certain dimensions can only lift a certain weight of cable to a given height. We may feel sure that our scientists are not leaving this problem unconsidered. Yet the escape of these five balloons last Saturday does not necessarily point to insufficient strength in the cables now used. In most cases it was probably due to the lack of training in the newly raised airmen of the B.B. squadrons. In one case the cable was allowed to run off the winch, and in most of the others a jerk in transferring the strain from the landing ropes to the winch cable seems to have caused the failure. A few months hence greater expertness is to be expected.

The Scope of the Barrage

SOME of the spectators seemed surprised that the balloons were sent up to only about four thousand feet, and remarked that enemy bombers could easily fly above them—in fact, a photographic aeroplane was seen circling above them. Admittedly the higher the balloons can go, the better; and, likewise, it must be admitted that in some circumstances the barrage may not be very much use. But at the worst it seems to be a very good protection against the low-flying raid, which is the form of attack most difficult for the guns and fighters to frustrate.

Intelligent onlookers also remarked that the enemy might shoot down the balloons. Some losses are to be expected, but for one thing a balloon is a very cheap form of defence, and, for another, six hundred balloons would take a lot of shooting down. Enemy bomber pilots would be very loath to fly below what they believed to be the ceiling of the balloons unless they felt assured that the "sweeping" operation had been very thoroughly carried out. The A.A. guns would not let the balloon-strafing machines of the enemy have an easy passage, and during the Great War attacks on balloons were looked on by pilots as among the most hazardous of enterprises.

Whatever the limitations of the barrage may be, it still is a form of defence which is well worth while, and we are very glad to learn that squadrons are to be formed in a dozen or so of the larger cities of the country which might be regarded as tempting targets by enemy raiders.

Pressure Cabins

ONE of the first pronouncements in the House of Commons of Capt. Balfour after his appointment was to announce the placing of orders for several new landplanes of more than 31 tons gross weight. At that time it was not permissible to publish the fact that the order had been placed with Short Brothers, but this has now been announced. The instant success which this firm had with its Empire Class boats gives justification for hoping that equally good results will be obtained with the new large landplanes.

Interesting as is the mere fact of planning landplanes of such great weight, the sub-stratosphere version with pressure cabin is the real great step. With an estimated cruising speed of 250 m.p.h. and a range of 3,000 miles, this type should have a great many applications on Empire and other long air routes, and thus is to be very heartily welcomed.

It is to be hoped, however, that work on pressure cabins will not be confined to very large machines. *Flight* has on more than one occasion expressed the view that pressure cabins may be demanded by passengers in all modern aircraft on account of the protection against air pressure changes which is thus afforded. It would be well not to lose sight of this possibility, and as American experiments have indicated that the extra weight is not prohibitive, aircraft designers would probably increase the sales value of their products by incorporating the airtight cabin feature. The fact that for normal operating heights it would not be necessary to include the pilots in the pressure cabin should simplify the work considerably.

The introduction on the air routes of landplanes of this great weight will raise fresh problems of runway surfaces. It is hardly to be expected that the ordinary grass aerodrome will suffice, and the assumption, therefore, is that selected aerodromes on the Empire routes will be prepared in readiness for the new giants.

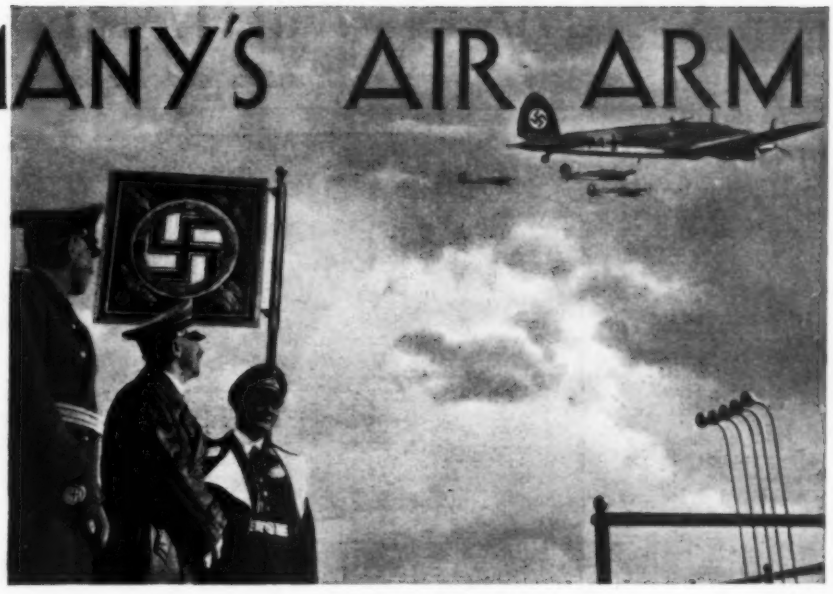
Forthcoming Events

October 12-15. Lilienthal Gesellschaft: Annual Congress, Berlin.
October 14. Northamptonshire Aero Club: Annual Ball, Salon de Danse, Northampton.
October 15. South Coast Flying Club: Annual Dinner and Dance, Grand Hotel, Brighton.
October 20. R.Ae.S. Lecture*: "Light Alloys in Aircraft Construction," by M. le Coeuvre.
October 21. Norfolk and Norwich Aero Club: Annual Ball, Norwich Municipal Aerodrome.
October 25. R.Ae.S. Students' Section Lecture†: "Wings and Control Surfaces," by D. L. Ellis, B.Sc., A.R.T.C., A.F.R.Ae.S.
October 25. R.Ae.S. Isle of Wight Branch Lecture: "Mechanical Testing of Aircraft Structure," by A. W. Clegg, B.Sc. A.F.R.Ae.S.
November 3. R.Ae.S. Lecture*; "The Meteorological Problem of the North Atlantic," by Capt. F. Entwistle, B.Sc.
November 8. R.Ae.S. Students' Section Lecture†: "Wind Tunnels," by E. A. Wright.
November 8. R.Ae.S. Isle of Wight Branch Lecture: "Aircraft Instruments" by Sqn. Ldr. Saker.
November 9 (Wednesday). R.Ae.S. Lecture*: "American Aircraft," by T. P. Wright, F.I.Ae.S., F.R.Ae.S.
November 17. R.Ae.S. Lecture*; "The Work of the D.V.L." by Dr. F. Seewald.
November 18. Brooklands Four-club Annual Dinner and Dance, Grosvenor House, London.
November 22. R.Ae.S. Students' Section Lecture†; "Meteorology," by F. Entwistle, B.Sc.
November 22. R.Ae.S. Isle of Wight Branch Lecture: "Future Development of Aircraft Construction," by Dr. Roxbee Cox.
November 25. Strathtay Aero Club: Annual Ball, Salutation Hotel, Perth.
November 25-December 11. Paris Aero Show, with Air Transport Congress.
December 1. R.Ae.S. Lecture*; "Flying Controls," by Prof. G. T. R. Hill, M.C., M.Sc., F.R.Ae.S.
December 6. R.Ae.S. Isle of Wight Branch Lecture: "Flight Testing," by Capt. Courtney.
December 15. R.Ae.S. Lecture*: "Some Results from the Deutsche Forschungsanstalt für Segelflug Smoke Tunnel," by Herr A. Lippisch, A.F.R.Ae.S.

* All these lectures take place at 6.30 p.m., at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1.
† All these lectures take place at 7 p.m. in the R.Ae.S. Library, 7, Albemarle Street, London, W.1.

GERMANY'S AIR ARM

Equipment of the Luftwaffe : New Twin-engined Fighter : Three Standard Bomber Types



Germany's leaders watch Heinkel He.111 bombers at a review.

IT is regrettable, in view of the conflicting statements regarding the efficiency of the German Air Force, or *Luftwaffe*, that more information on its equipment is not available. However, a certain amount of data have filtered through to this country by devious means, and some of them are given hereafter.

So far as is known, the Messerschmitt Bf.109 and Heinkel He.112 single-seater fighter monoplanes have practically superseded the old Heinkel and Arado biplanes. Both the new monoplanes are of low-wing layout, the Heinkel having the characteristic inverted-gull centre section. The high performance of the Messerschmitt is due in some measure to the installation of Handley Page slots and flaps.

Both types have been fitted with the 650 h.p. Junkers Jumo and the 950 h.p. Daimler Benz DB.600 inverted-vee twelve-cylinder petrol engines, but photographs which have appeared of the machines in squadron use show only the lower-powered unit. It was a development of the Heinkel, with a Daimler Benz DB.601 engine of at least 1,300 h.p., which reached 394 m.p.h. in the hands of General-Major Udet.

Normal armament of the Heinkel, as offered for export, is one small-bore shell-gun and two machine guns.

Later prototype fighters include the Messerschmitt Bf.110 with two of the new DB.601 engines of over 1,300 h.p. each. The speed of this type is supposed to be well over 350 m.p.h., and the armament includes shell-guns. It is reported that the Focke-Wulf concern has a single-engined pusher type under development.

Dive Bombers

Germany has for some time favoured the single-engined fighter-dive bomber as typified by the Henschel Hs.123 biplane and the peculiar Hamburg Ha.139 monoplane. Both these types are illustrated in our drawing overleaf. The top speeds of these machines are respectively 220 m.p.h. and 205 m.p.h.. Junkers have developed a two-seater—the Ju.87—specially for dive bombing, and have incorporated specially strengthened flaps to reduce the diving speed. This type is now on the export market.

It is believed that there are numbers of modified Heinkel He.70 single-engined monoplanes in service as reconnaissance machines and light bombers. The old type of Heinkel two-seater observation biplane with B.M.W. VI liquid-cooled engine is outclassed by the Henschel Hs.126 parasol monoplane with B.M.W. radial.

So far as is known, there are three types equipping the majority of Germany's bomber squadrons—the Dornier Do.17, Heinkel He.111 and Junkers Ju.86K.

The Do.17 was described at considerable length in *Flight* of April 14, 1938, and in its standard service guise is normally powered with a pair of B.M.W. VI engines, though the Daimler Benz DB.600 and the Bramo Fafnir nine-cylinder radial have been fitted comparatively recently.

Judging from figures released for the civil version of the Heinkel He.111, the top speed of this type is in the neighbourhood of 260 m.p.h., which is probably 10 or 20 m.p.h. below that of the smaller Dornier with similar engines.

A large number, if not all, of the Ju.86s in service are fitted with Junkers Jumo 205 diesel engines. Their performance is comparatively low, but their range should be really useful.

Flying Boats

On the marine side there are a number of militarised versions of the Dornier Do.18 monoplane flying boats with two Junkers Jumo diesel engines. These machines are characterised by very long range, but their speed is comparatively low—so low, in fact, that it was not considered worth while fitting cupolas over the gun rings. They are intended mainly for reconnaissance, but alternatively can accommodate a fair bomb load. It is not definitely known if the larger Do.23, as developed for the Dutch Air Force, has yet been supplied in quantity. This type has a top speed of over 200 m.p.h., and is normally powered with three radial engines of 850/1,000 h.p.

For some years the *Luftwaffe* has been using old Heinkel twin-float seaplanes of both single- and twin-engined types. In either case the B.M.W. engine was specified.

A large number of experimental prototypes have appeared during the past year or two, including an Arado fighter with parasol wings and a retractable undercarriage; the Dornier Do.19 heavy bomber monoplane with four Bramo radials (on the lines of the Boeing B-17); the Arado Ar.95 general-purpose, twin-float seaplane now on the export market; and a Henschel twin-engined fighter monoplane, as illustrated overleaf.

It is rumoured that the Dornier Do.19 and military versions of the Junkers Ju.90 and Focke-Wulf Condor were intended to equip bomber squadrons, but that the specification was cancelled when General-Major Udet came into office.

Two Outstanding Issues of FLIGHT:

BRITISH AIRCRAFT INDUSTRY NUMBERS:

October 27 COMPLETE AIRCRAFT
November 3 ENGINES, EQUIPMENT and MATERIALS

GERMAN MILITARY AIRCRAFT

Fighters, Bombers and Reconnaissance Machines of Contrast

LEFT

(Top to Bottom)

Henschel twin-engined fighter with two inverted-vee Junkers : Probably not standard.

Junkers Ju.86 K bomber with two Jumo diesel engines : Equips a large portion of bombing force.

Messerschmitt Bf.109 single-seater fighter with inverted Junkers liquid-cooled engine : A standard type.

Heinkel He.112 single seater fighter with Junkers inverted vee engine : A standard service type.

Henschel Hs 126 reconnaissance monoplane with B.M.W. radial : Counterpart of our Lysander.

Henschel He. 23 single-seater fighter-dive bomber : A standard machine with B.M.W. radial.

RIGHT

(Top to Bottom)

Dornier Do.17 bomber with two B.M.W. liquid-cooled engines : A standard type for over two years.

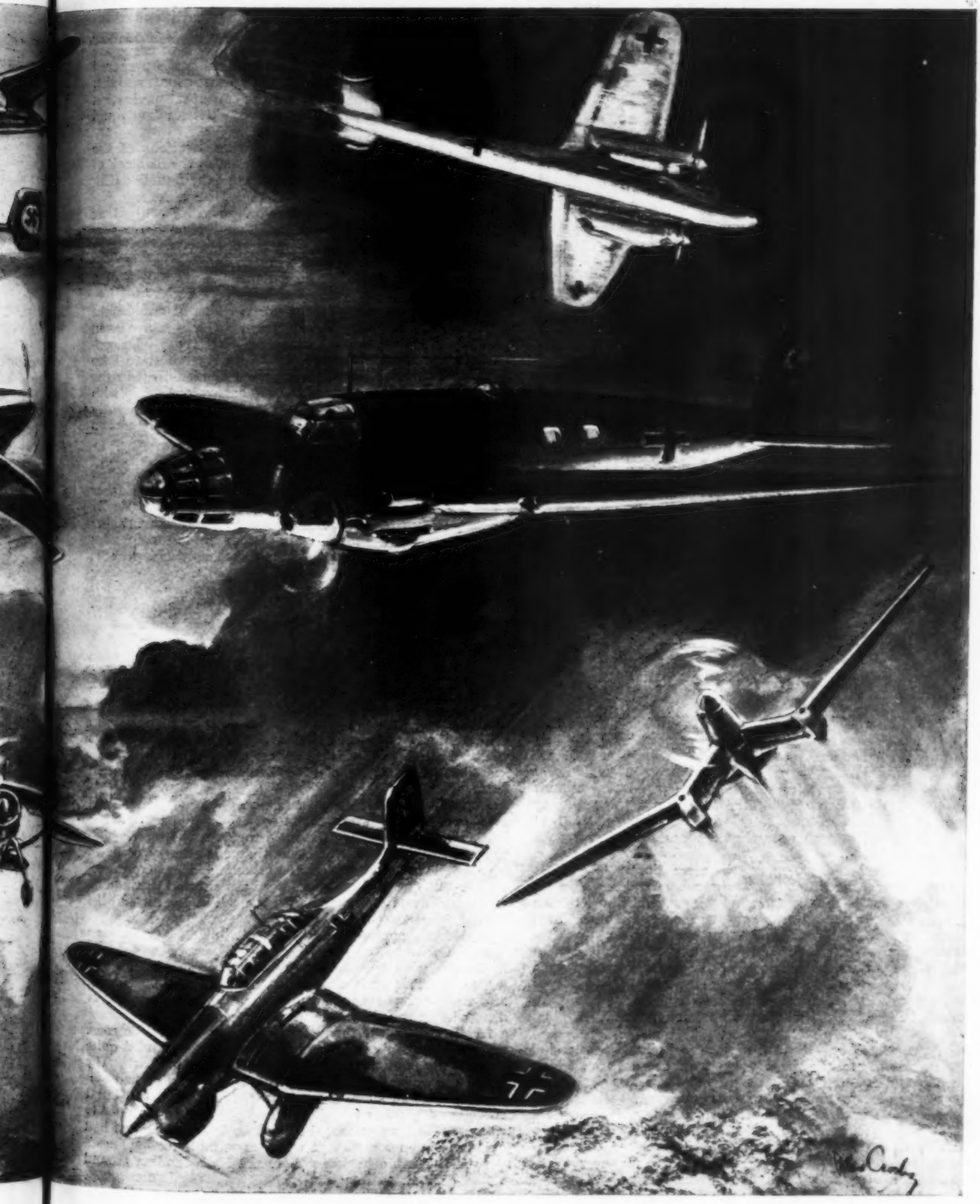
Heinkel He.111 with two inverted-vee Daimler-Benz engines : Developed from the commercial type.

Hamburger Ha.137 single-seater fighter-dive bomber with inverted-vee Junkers engine : Has a tubular-spar wing.

Junkers Ju.87 two-seater dive bomber with inverted-vee Junkers : Has flaps to reduce diving speed.

REPRESENTATIVE MODERN TYPES

ontrast ign : Standard and Experimental German Air Force Equipment



PRIVATE FLYING

" . . . these odd little gasbags "

Topics of the Day

Man-traps

WE know about the number of prohibited areas which are springing up all over the Continent, but very little is ever said about the areas—not exactly prohibited but often equally dangerous—which are appearing week by week on the flying maps of England. Actually, the British prohibited areas are arranged fairly simply and do not cover very vast stretches of country; few of them demand more than a momentary divergence from the track.

Of danger areas, however, there are dozens, and it is only a very earnest amateur who manages to keep his map markings sufficiently up to date to prevent himself from flying all unknowingly into some section of the sky which may be plastered with screaming shells or darkened by balloon barrages. Luckily, at every one of the larger aerodromes it is usually somebody's duty to mark a large-scale wall map with such areas, and when plotting a track it is only necessary to go either into the club premises or the control office to see whether this track is liable to cross any gun trajectory.

Previously, I imagine, the majority of pilots have tended to ignore the more ordinary types of danger area where somebody or other may or may not have fired a gun or two at irregular intervals. One always feels that the chance that one's flight path will coincide with that of a shell is very remote indeed.

For some time pilots have been extremely careful, however, to avoid the Cardington area, where all the original balloon experiments have been carried out, and almost daily, except during the week-end, one can see these odd little gasbags floating in twos and threes over or near the big airship sheds. With the increasing defence needs this Cardington area has, more or less recently and without a reduction of its own size, spread in driblets to various parts of London. At present these new danger areas are situated mostly on the east side, but unless one is prepared to climb to 13,000ft. in the course of a cross-country flight, these new and very real danger areas can upset navigation very seriously when travelling between the Midlands and the south-east coast.

The most recently established of these sections of the sky in which earnest volunteers practise the control of tethered balloons, are those at Lakenheath, Suffolk; Kidbrooke, Kent; Chigwell, Essex; and Hook, Surrey.

Finally, within a circular area of 20 miles centred at Westminster Bridge, flying without navigation lights proceeds nightly. Fortunately or unfortunately, the amateur pilot does not yet fly by night except on the one occasion after he has decided that he will provide himself with a " B " licence.

Most of the more important obstructions of any height are marked on the flying maps which may even have been bought several years ago, but those who continue to use these old maps should do their best to keep them up to date. For a long time I tended to scan the *Notices to Airmen* dealing with map corrections solely with the idea of picking out new aerodromes, but more recently I have realised the importance of what is so aptly known as an " airway obstruction."

It is not often that one is flying in such poor visibility that these obstructions cannot be seen in daylight, but there are times when a pilot is forced to carry on under a low cloud-ceiling (perhaps in heavy rain, which usually obscures the windscreen), and in such circumstances any failure to make suitable modifications to the map adds considerably to one's worries. As I remarked a few weeks ago, nothing is more unpleasant than to be pushing along in the clear knowledge that, somewhere within a few miles, there is a series of wireless masts the tops of which are well above one's flying altitude.

First-hand Information

THE need for obtaining accurate information from an experienced source about some of the smaller and less-used landing grounds and fields is equally obvious. In this country we have our *Notices* dealing with such matters where licensed grounds are concerned, and the A.A. can tell you all about its own particular brand of inspected fields.

Abroad, however, these assistances do not apply, and even over here amateur pilots sometimes consider that it is a sign of unnecessary fussiness to make the most tentative inquiry. The result is that they sometimes put down in what is supposed to be an excellent field or aerodrome, only to find that the grass has not been cut and the landing run is perilously completed with the tail in the air and the heart in the stomach.

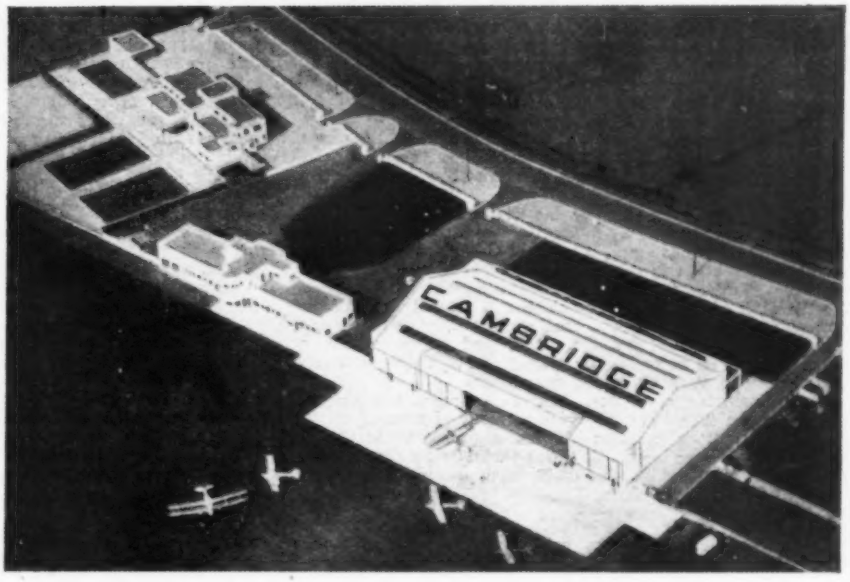
Earlier this year I heard, secondhand, of a very good case. A friend of mine was sitting in a hotel somewhere in France with two personages of some aeronautical importance. This hotel overlooked the local landing ground, and these personages were arguing about the usability or otherwise of the ground in its then present state.

While still in the throes of acrimonious discussion some private pilot came in with his light aeroplane, landed quite successfully, but promptly went over on to his back. The grass was at least three feet long, and this pilot had evidently failed to make enquiries. Nobody was hurt, but I thought of another friend who had planned to fly over to this very landing ground, but had made enquiries and had evidently been told that it was " unsuitable for landings " —though what other uses there are for a landing ground I find difficult to imagine.

INDICATOR.

CEREMONY at CAMBRIDGE

The Air Minister Opens the New Home of Marshall's Flying School



Situated just over two miles to the east of Cambridge and lying on the south side of the Newmarket road is the new Cambridge Aerodrome, opened last Saturday by Sir Kingsley Wood

LAST Saturday's official opening of the new Cambridge Aerodrome by Sir Kingsley Wood, M.P., Secretary of State for Air, was in many respects a personal triumph for a business partnership that is unusual in aviation—that of a father and son. Marshall is the name, the initials D. G. and A. G. G. Briefly, they became interested in flying when Marshall *père*, proprietor of a prosperous Cambridge motor business, purchased an old hangar from H.M. Disposal Board and, at a later date, an aeroplane. The next step came when the son (A. G. G.), fresh from athletic and scholastic triumphs at the 'varsity—he is an M.A., and is (or was) a brilliant runner—landed in a field behind the family homestead.

From that moment the idea of a Cambridge aerodrome germinated. In 1934 the Cambridge Aero Club came into being. Two years later Cambridge University became interested, then came the R.A.F. Reserve and, better still, the Marshall's Flying School was appointed to instruct the Oxford Reserve! Very soon it was found that the original field, lying within a mile and a quarter of the centre of Cambridge was too small, so a larger site, less than a mile farther out on the Newmarket road, was selected. It was here that last Saturday a most distinguished gathering, drawn not only from Cambridge, but also from the aviation world without, had come to greet Sir Kingsley Wood, who was destined to repeat, yet once again this year, the magic formula, "I now declare this aerodrome open."

Forces—Natural and Otherwise

Many guests, arriving by air, braved an approaching warm front with its attendant unpleasantnesses, and some (as we ourselves found to our considerable inconvenience) had to beware of London's own pets, the barrage balloons, which were being exercised on their leads that day. Altogether some thirty-five aircraft were assembled on the tarmac outside the new buildings. The ground staff, supplemented by the A.A. and the Civil Aviation Service Corps members, worked hard to cope with arrivals, enquiries and the hundred and one problems that arise on such occasions.

Promptly at 12.30 hours the Air Council's silver D.H.86B., touched down, bringing with it the Air Minister and his entourage. The assembled company, by now swollen to some 300 strong, then adjourned to the marquee for lunch, as guests of the Marshalls.

The first speaker was Field-Marshal Lord Birdwood, G.C.B., G.C.S.I., G.C.M.G., G.C.V.O., C.I.E., D.S.O., whose task it was to propose the toast of "H.M. Secretary of State for Air" in the absence of the Lord-Lieutenant of the County, who was unfortunately indisposed.

It was to be expected that Sir Kingsley Wood, in his reply, should dwell on the recent avoidance of war. He stressed that much had been done, but much remained to be done in connection with our air defences. The resultant expenditure, he said, was in reality an insurance premium for our safety and security.

Sir Kingsley went on to say that there had been a remarkable response to the appeal for recruits for the Royal Air Force. Between 900 and 1,000 pilots had started training since the beginning of the financial year. Over 300 men had started training as observers, while some 2,000 boys had been recruited as apprentices. In addition, over 11,000 men had entered the Service as recruits. He then went on to speak of the defence methods not only for London, but also for the provinces, and in this connection announced the formation of training centres and balloon barrage depots at Birmingham, Bristol, Liverpool, Manchester, Hull, Newcastle, Plymouth, Southampton, Glasgow and Cardiff. These new units would be administered by the various Territorial Associations. Finally, he disclosed the astounding fact that over 30,000 applications had been received for the Civil Air Guard. [As detailed on p. 318.—ED.]

More Friendly Atmosphere

Dr. N. A. de Bruyne, M.A., Ph.D., then proposed the next and final toast, "The Cambridge Aerodrome," and in doing so paid a fine tribute to the foresight and determination shown by the Marshalls—brothers, he preferred to call them. Mr. D. G. Marshall, M.B.E., replied as the senior member of the partnership. After recounting the early history of the flying school he went on to add that some of their neighbours were not exactly friendly at their old ground, so they moved farther out from town. He asked for the good will and indulgence of all concerned. Finally he called upon Sir Kingsley Wood to declare the aerodrome open.

As the guests filtered out of the marquee the Cambridge University Air Squadron went aloft in nine Auro Tutors and gave a demonstration of air drill, to be followed by a throttled-down programme given by three Supermarine Spitfires. Next came the Cambridge R.A.F.V.R. in three Harts to give an exhibition of formation work, followed by a fine aerobatic exhibition by Sgt. Worsdell.

Soon after 15.40 hours, the Air Minister departed, but quite an interesting programme remained to be carried out. Demonstrations were given of the C.30 Autogiro, the Percival Mew Gull and Q.6, two gliders, and last, but not least, the Scheldemusch, the display drawing to a close just before the ever-threatening rain settled down to a steady drizzle.

"The Aircraft Engineer" Next Week

OWING to the fact that the October 27 and November 3 issues of *Flight* will be the special British Aircraft Industry Numbers, *The Aircraft Engineer* supplement, which normally appears in the last issue of each month, will be included in next week's issue, October 20.

Private Flying

OVER 30,000 AIR GUARD APPLICATIONS

Temporarily "Full Up," But Enrolments May Still be Made at C.A.G. Headquarters

NOT because no more recruits are required, but simply to give the aeroplane clubs a breathing space in which to cope with the enormous number of enrolments already made, a temporary halt is being called in Civil Air Guard recruiting by the clubs. Intending members must apply, instead, direct to the C.A.G. Commissioners.

In a statement issued last Saturday, the Air Ministry says that over 30,000 applications have now been received, and these are continuing at the rate of more than a thousand a week.

Following representations by the Civil Air Guard Commissioners, the Secretary of State for Air, Sir Kingsley Wood, has reviewed the position, and in view of the successful response to the scheme and of the very large number of applicants now registered, he has decided that for the present the club lists for the Civil Air Guard will be closed. This will allow of the absorption of the numbers from whom applications have already been received by the clubs, and these will, it is believed, in most cases occupy all the facilities now available or likely to be available in the near future.

The Commissioners are now, in consultation with the clubs, working out a scheme under which as many as possible of the candidates on the club lists shall receive ground instruction in aviation matters while waiting the opportunity for flying training. Those who receive this instruction pending their flying training will be enrolled as Civil Air Guard members, but will, of course, not be entitled to wear their "wings" until they have qualified for their pilot's licence.

The Commissioners of the Civil Air Guard themselves explain the present position, adding, for the information of intending applicants, that those members of the public who wish to be considered in the future for Civil Air Guard training are invited to apply in writing to the Secretary of the Commission of the Civil Air Guard, Ariel House, Strand, London, W.C.2, stating where possible the name of the club at which they would prefer to be trained as facilities become available.

These applications will be acknowledged and all names recorded in order of application in the Commissioners' office. As soon as any individual club is in a position to train further applicants, those who have recorded their names at C.A.G. Headquarters, and who live near the club in question, will be put in touch with the club authorities, in order of their recorded priority, with a view to their enrolment at the club for training.

The Commissioners hope that those who come forward in this way to record their names will realise that, although they will have priority of consideration over persons whose names do not appear on the record, some considerable time must necessarily elapse before the clubs have cleared their present waiting lists and are in a position to accept further members for ground and flying instruction.

FROM the CLUBS and SCHOOLS

LONDON

OWING to the very rough weather experienced last week only 65 hr. 45 min. flying was completed. Mr. H. E. Jones became a member.

HERTS AND ESSEX

Flying was held up by the high winds but 153 hours were logged. Mr. P. E. Hindmarsh made his first solo, and night flights were carried out by Messrs. J. E. Brown and E. H. Statham. For September a total of 434 hours was recorded.

BORDER

Due to the extremely high winds which were blowing continuously last week there was very little flying. The club now has five machines in commission and an order for two more has been placed. The C.A.G.s flew 85 hours and one member has made his first solo.

ROMFORD

Of the 225 hours' flying instruction given at Romford, 112 hours were taken by members of the C.A.G. Two of these, Messrs. J. R. Keats and J. Calfe, made their first solo flights. Forty-five new members joined during the month, including Mr. Harold Ramsey of organ-broadcasting fame.

REDHILL

The first squash match of the season, played against Mr. Adams' VI, resulted in a win for Redhill by four matches to two. Flying was curtailed by bad weather and only 74 hours were flown for the week ended October 8. Four new members joined and the C.A.G. applications are now over the 1,000 mark.

SOUTH COAST

Over fifty members of the C.A.G. are taking training and as they obtain their "A" licences their places will be filled by other applicants. High winds and heavy rain have held up flying but, nevertheless, instructors and machines have been busy whenever the weather permitted. The annual dinner and dance will take place on Saturday, October 15, at the Grand Hotel, Brighton, when awards will be presented.

C.A.S.C.

In spite of the very bad weather during the first week-end of October, the Corps' flying times totalled 14 hr. 45 min., most of which consisted of advanced dual.

NEWCASTLE

Bad weather on Monday and Tuesday of last week reduced the flying time to 34 hr. 30 min., of which 26 hr. 40 min. was spent on C.A.G. work. In the C.A.G. section it is expected that 106 pupils will be under instruction next week.

STRATHTAY

The annual ball of the Strathtay Aero Club has been fixed for November 25, and will take place in the Salutation Hotel, Perth. For September a flying total of 130 hours was arrived at, and of this total C.A.G. members accounted for 28 hours. Mr. A. C. Melville Errol has now obtained his "A" licence.

BROOKLANDS

A party of members anticipates flying down to Shoreham next Saturday for the annual dinner of the South Coast Flying Club. Another handicap competition will be flown off next Sunday, this time in the form of a map-reading event. The car treasure hunt, organised this week, was won by Mr. E. J. Walter.

EDINBURGH

Progress with C.A.G. training at Edinburgh is shown by the fact that members of this denomination put in 5½ hours' solo flying, while the dual instruction total was 10½ hours. Club dual and solo totalled 17 hours, though bad weather considerably curtailed the amount of flying done. Eight machines visited Macmerry.

NOTTINGHAM

Applications for C.A.G. enrolment now number nearly 500 at Nottingham and 23 members are in training. During the month of September the club put in 103 hours' flying and during the week which ended on September 29 the total was 23½ hours. Messrs. J. Garton, W. O. Stokes, D. Cresswell and T. Bullus made their first solos, while "A" licences were obtained by Messrs. K. Smedley and K. H. Temple.

Useful for "A" Aspirants

THE Redhill Flying Club has recently produced a little booklet in which all the essential rules of the air are explained and illustrated. At the beginning a page is devoted to a short exposition of the different requirements for the "A" licence.

Although the information in this book is naturally not sufficiently extensive to supply the pupil with the necessary knowledge for his "A" licence *viva voce* examination, the producers must be congratulated on the score that they might easily have attempted to compete with other and more complete handbooks on the subject. As it is, the rules, signs and lighting regulations are briefly covered in such a way that the pupil will have little difficulty in remembering all the points concerned. At the end of the book the procedure involved in foreign touring is explained, and the controlled zone regulations are given in sufficient detail to prevent the ignorant novice from possible transgression.

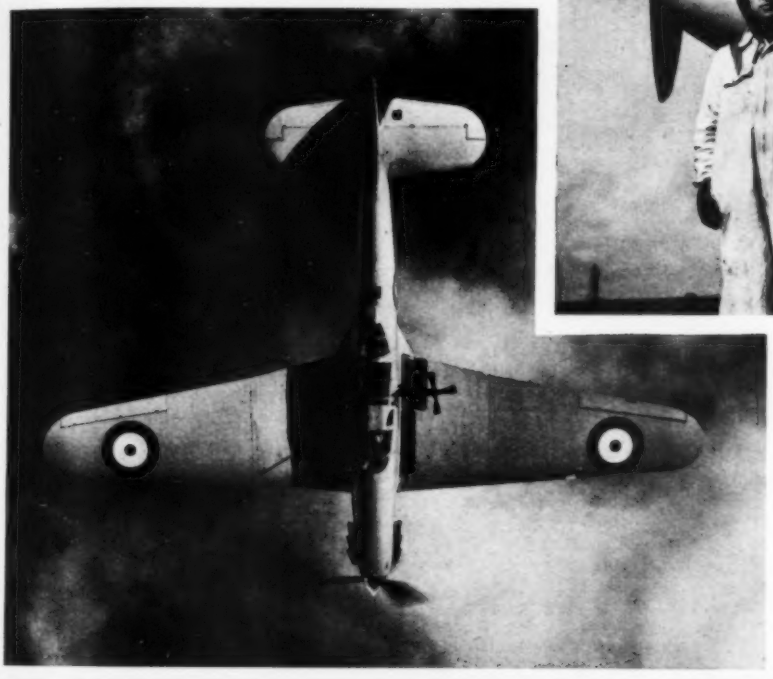
Gatwick Activity

AS from October 1, the Insurance Flying Club, which formerly operated at Hanworth, is established at Gatwick Airport.

Incidentally, No. 19 R.A.F. Elementary Flying Training School has now started operations at Gatwick. A new hangar intended to house the sixteen Magisters for this school is in course of construction, as are two new hangars for the Air Ministry adjacent to the Airwork premises.

FOR MODERN AIR GUNNERY

To Tow Drogue Targets at High Speed : the Hawker Henley



THESE *Flight* photographs are some of the first views secured of the production-type Hawker Henley, as adopted for high-speed target towing and built by the Gloster Aircraft Co., Ltd. It may be significant that the bomb traps and gun mounting have been retained. The engine is the Rolls-Royce Merlin

In the plan view the windmill for the sleeve target is seen turned edge-on to the air stream. The top view portrays the pilots who are testing the Henley — Flt. Lt. M. F. Summers and F/O. P. E. G. Sayer.

B

"Flight" photograph

Loading cameras and equipment into a Hawker Audax.

R.A.F. Units Visited

THE SCHOOL of PHOTOGRAPHY

Comprehensive Training at Farnborough

By JOHN YOXALL

PHOTOGRAPHY and Farnborough have been closely associated ever since the earliest days of the Royal Flying Corps—or even earlier than that, if we go back to the time of the Air Battalion, Royal Engineers. It was at Farnborough that the first experiments in photographic military reconnaissance from kites, balloons and dirigibles were carried out.

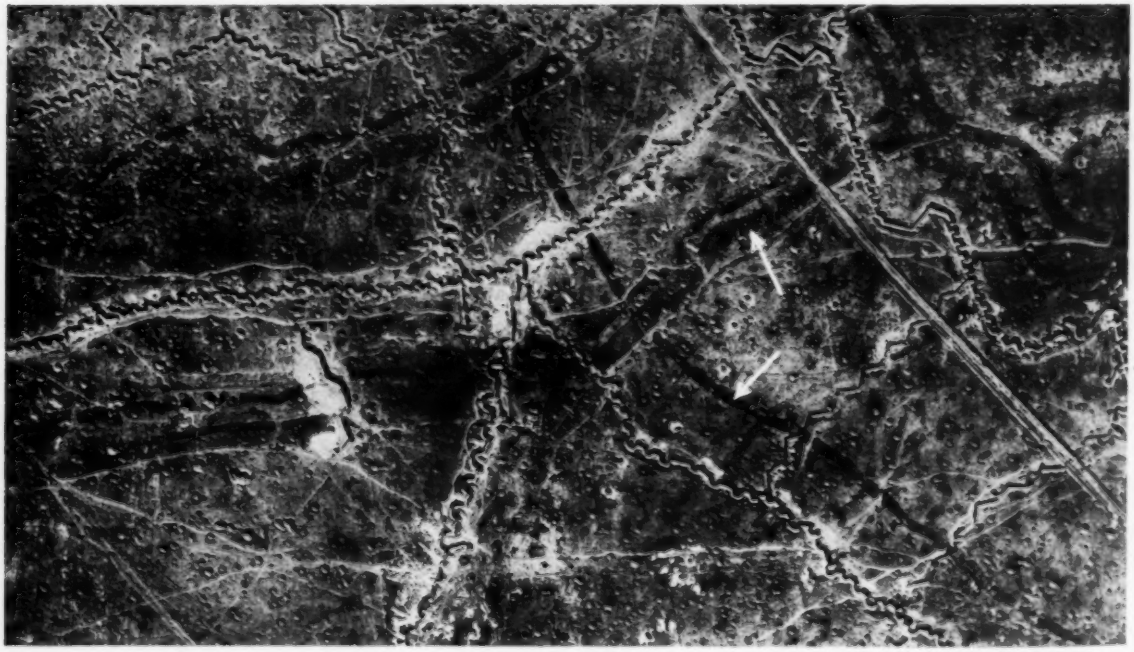
Thus, it is not surprising that this was the site chosen for the School of Photography when the need for specialists became so urgent shortly after the outbreak of hostilities in 1914. It was, however, early 1915 before the school got going and 1917 before the whole of the training of photographic personnel was carried out there. These conditions have obtained ever since and, at the moment, big extensions are being made to cope with the extra intake necessitated by Expansion Scheme L.

Since 1934 the school has been training boys, but now it is handling direct-entry men from 17½ upwards who come to Farnborough after a disciplinary period lasting ten to twelve weeks.

The course at the school occupies six months. Elementary optical principles and photographic chemistry take up the first two weeks. The next eight are spent learning negative-making and printing. Subjects totalling twenty-nine sub-heads have to be learned during that ten-week period, which corresponds to a civil-life apprenticeship of five years or so.

Training from the eleventh to the fourteenth week deals entirely with construction, maintenance and installation of air cameras, and is the first taste of specialisation, which becomes more pronounced as the course proceeds. Darkroom work takes most of the time for the next four weeks and is devoted almost exclusively to processing films from air cameras and cine camera guns. The students' knowledge of practical photographic work is then considered to be complete.

Map-making from photographic mosaics disposes of a further three weeks, and the next four—the twenty-second to the twenty-fifth inclusive—are devoted to what is called General Service Photography. This includes such items as stores procedure, section organisation, training in mobile workshops and general revision of all subjects. The climax is reached in the final week, when the passing-out



R.A.F. official photograph, Crown copyright

How a trench system, railway and shelled area appear in a vertical aerial photograph. White arrows indicate barbed wire, several lines of which can be seen. This is a typical picture of the kind used in the Air Photograph Interpretation Course at the Farnborough school.

"Flight" photographs.

(Above, left) Mosaic map-making at the Farnborough school. In various Overseas areas, where accurate maps are non-existent, the Royal Air Force makes its own by this means, and also supplies the other Services.

(Above) Teaching tank development of aerial films.

(Left) The instructional staff. Left to right: W/O. Rowe, Flt. Lt. Elliott, Sqn. Ldr. Silvester (C.O.), F/O. Dunton, Flt. Sgt. Saxby.

examination is held, and 80 per cent. marks or over ensures the rank of Leading Aircraftman on the pupil being posted to a squadron.

Men are also sent to the school from squadrons to take their examinations for higher rank. The Central Trade Test Board send exam. papers to the unit and 70 per cent. qualifies an aspirant to attend Farnborough for the practical test. As in the previous case, 80 per cent. is required to pass, and since the examination is divided into two parts—photography as photography and photography as applied to the Service—it is necessary for the examinee to attain the passing percentage in each part; 90 per cent. in one and 70 per cent. in the other is not good enough.

The output in the past has been approximately five officers and 100 airmen or boys per year. One instructor is available to each eleven trainees. Presumably these figures will be considerably exceeded when the new buildings, which are in course of construction, become available.

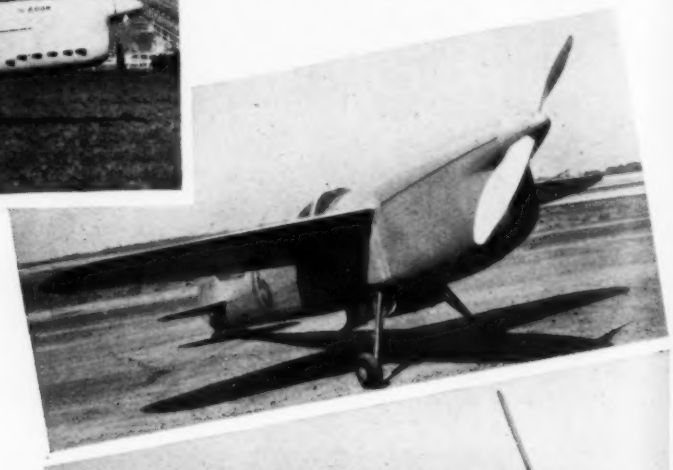
In addition to the photographic training there is an Air Photo Interpretation Course which lasts for some two or three weeks and is attended by twelve or fourteen Army officers. In future, however, retired officers will be taking this course and, when qualified, posted to units as intelligence officers. This arrangement, it is thought, will save interference with the routine regimental duties of serving officers.

Photography is an ever-changing compromise between an exact science and guesswork, and experience is an essential adjunct. The School of Photography is doing excellent work by reducing that compromise very largely to a rule of thumb and ensuring a good supply of high-grade operators for the squadrons.

Learning the operation and construction of the Williamson cameras which form the photographic equipment of the Royal Air Force.

"Flight" photograph

The Chester Model 550 on the left has a Menasco C6S-4 giving 290 h.p. Below is the Folkerts SK 4, which uses a similar power plant.



MORE SPEED in the STATES

Formidable Little Craft in Greve and Thompson Pylon Races

THE week before last we published an American correspondent's account of the Bendix Trophy Race. The same contributor now sends the story of the Greve Trophy Race and the Thompson Trophy Race, annual pylon events that attract a field of odd and often vicious-looking little "specials." Again we present the report in its native phraseology:—

The Greve race was held on September 4 at the Cleveland Municipal Airport, as part of the National Air Races. Open to racing planes of 544 cu. in. displacement and under, the event was flown this year over 20 laps around a 10-mile course. Speed trials were held on three preceding days and those surpassing the 200 m.p.h. mark were eligible to compete.

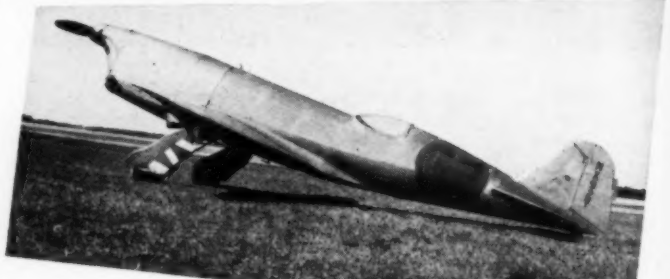
The race attracted a goodly number of entrants, most of which were powered by Menasco engines. Many were new creations, the older ones having crashed at various times last year, killing their pilots. So this year there were several newcomers to the game, with new ships. In spite of the advance speed trials, some could not get all the bugs out in time. However, the six entrants that did reach the starting line put up a good show and gave the 73,000 thrill-crazy spectators their money's worth.

But before we describe the race proper, let us go back and see what happened at the speed trials. Those who entered their ships were as follows: Art Chester in *The Goon*, Roger Don Rae (*Eight Ball*), Tony Le Vier (*Firecracker*), Russ Chambers (*Chambermaid*), Walter R. McClain (*San Diego Flaggship*), Marion McKeen (*Miss Los Angeles*), George Dory (Bushey-McGrew Special, *Bumble Bee*), Joe Jacobsen (*Folkerts* SK-4), Harry Crosby (Crosby Special), Earl Ortman (*Jackrabbit*), Clarence McArthur (*Delgado Flash*).

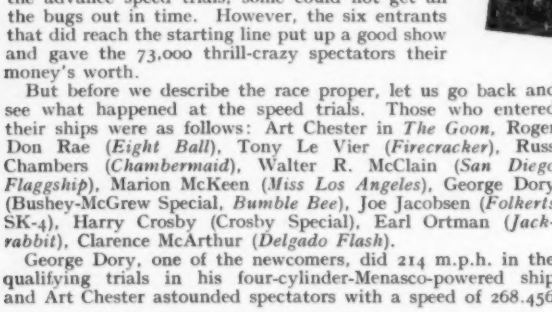
George Dory, one of the newcomers, did 214 m.p.h. in the qualifying trials in his four-cylinder-Menasco-powered ship and Art Chester astounded spectators with a speed of 268.456 m.p.h. with his new six-cylinder Menasco around the ten-mile course. As the others began their trials the fun started. Russell Chambers in his *Chambermaid* had engine trouble and had to make a forced landing in a small field, dodging trees, fences, and the like until the plane finally connected with one tree, which wound it up into a pretzel. He climbed from his steed rather shaken and walked to an awaiting ambulance. After having some stitches sewed into his forehead he left the hospital in apparent good health, and a day or two later he collapsed in a hangar and was once more rushed to a hospital. Poor Russ died a few hours later, and it was found that his skull had been fractured.

Eight Ball, said to be one of the fastest of the Menasco-powered ships, developed wing flutter after passing the 250 miles per hour mark, and Roger Don Rae almost had to jump for his life. The ship was landed O.K. and Joe Jacobsen flew it in the Greve Race at a slow speed, but next year it should show its true worth with a beefed-up wing.

Jacobsen had intended to fly a Folkerts Special of new design in the race, but on trial hops he found it had murderous tendencies in flight and withdrew it from competition.



Harry Crosby's CR 4 must be one of the most beautiful "racing ships" ever to appear at Cleveland. It has a six-cylinder Menasco giving 300 h.p. Above it (No. 21) is the Chambers R-1 special with a four-cylinder Menasco. This machine killed Russell Chambers.



Walter McClain's diminutive Pobjoy Niagara-powered monoplane, designated the F.15

The Elmendorf Special or Marcoux-Bromberg *Jackrabbit* with a 250 h.p. Menasco B-6S.

Marion McKeen, in his very much revamped *Miss Los Angeles*, was forced to land his ship on its belly when the landing gear refused to come down, and he was out of all competition, as was McClain when his little Pobjoy speedster, built by the employees on the Consolidated Aircraft Corp., turned up on its nose in a bad landing.

After those very definite eliminations were completed the gun sounded for the start of the 1938 Greve Trophy Race. Tony Le Vier was rather slow in taking off, as is usually the case with the small Keith Riders, but it did not take him long to get up in the lead. At his tail came Art Chester in *The Goon*, Joe Jacobsen in the *Eight Ball*, George Dory in the McGrew Special, the Crosby Special with Harry Crosby up, and Earl Ortman (Keith Rider).

The race was a two-man affair from the start, with Chester nagging at the tail of Tony Le Vier, who was pouring the coal into his *Firecracker*. In the middle of the race George Dory's engine went dead five miles from the airport. Staying with his ship he tried to preserve it by landing in a street just below him. However, the street was a dead-end, and after shearing down a mail box he made good connection with a large tree, causing quite a disturbance in the neighbourhood. George was pulled from the wreckage semi-conscious, and we hope for a speedy recovery.

Fire in the Air

Then Harry Crosby added to the excitement, as is his usual and unfailing custom, when his engine overheated and poured flames back into the cockpit. Harry raised the enclosure and was about to jump when the heat subsided enough for him to make a hasty landing at the field. In the meantime Art Chester was moving up on Tony Le Vier inch by inch as they wound around the pylons just a few feet from the ground, while Jacobsen and Earl Ortman had their own little race farther behind. On the next to the last lap Chester finally overhauled Le Vier, bringing the shouting spectators to their feet. As the planes roared down the home stretch Le Vier gave his ship everything he had, and once more nosed out Art Chester to mark one of the most thrilling races in the annals of the National Air Races. Jacobsen was placed third and Ortman fourth.

Le Vier not only captured first prize of $10,000, but also captured an additional $2,000 for breaking the race record, formerly held by the French pilot Detroyat at 247.3 m.p.h.; Le Vier's speed was 250.88 m.p.h. Chester's was 250.416 m.p.h., and Jacobsen just cruised around at 218.387 m.p.h. with inevitable wing flutter and all.

Some notes on features of certain of the planes entered may be of interest. The most outstanding feature of the new *Goon*, younger brother of *The Jeep*, is the French Ratier two-position propeller, a much later model than the one Detroyat used on his ship. It cost Chester somewhere in the neighbourhood of $1,500 to get it from France. It is said that Chester thought the propeller would turn counter-clockwise, as is the usual custom of European planes, and therefore had his Menasco engine's rotation reversed, but when the prop arrived it turned out to be a clockwise one, and the engine rotation was hurriedly changed once more!

Art Chester was one of the first to introduce a small specially built racing plane at the Air Races, and has had much experience designing and flying them since. He has been connected with the Menasco Company, and that, undoubtedly, is one of the reasons why he was able to design an engine installation that would work so well on its first public appearance. His airplane has a long, narrow fuselage of light steel tube construction, fabric covered, with a large gas tank just between him and the engine. Enough fuel is carried for the 300-mile Thompson Trophy Race. The wing is of all-wood, two-spar construction with a very sturdy front spar to take the loads as the ship is whipped around the pylons.

Incidentally, *The Goon* was the only mid-wing racer with the line of thrust above the wing. Data include: Span, 18ft. 6in.; length, 21ft. 4in.; wing area, 66 sq. ft.; gross weight, 1,680 lb.; wing loading 25.5 lb./sq. in.

Tony Le Vier's *Firecracker* has seen three years of service. After some very extensive tests with various changes in the plumbing system and revamping of the engine, the plane has become the fastest in its class at the present time. Several types of propellers were used on the plane until the present large wooden one proved most successful. Construction of the plane is all-wood with fabric covering. A silk covering is also put on over the plywood sheet on the wing to give added smoothness. The stubby little landing gear retracts inward.

The *Eight Ball*, flown by Roger Don Rae during tests, is a unique airplane and is Keith Rider's latest creation. Much money was spent in its development, and had all the bugs been exterminated in time the airplane would have proved to be one of the fastest. Its smooth outside surface is due to its moulded wood construction, which is now rather popular in the United States. Manufacturers such as Fairchild (using the Duramold process), and the Bennett Aircraft Co., have recently acquired A.T.C.s for new planes of moulded wood construction, with a form of Bakelite material to hold the shape and give supreme smoothness. The entire airplane appears as though it has just come out of a clay mould.

Structurally, the wing has been built very ruggedly and it is difficult to perceive why wing flutter should occur. Possibly it was just the ailerons that fluttered, and in that case the trouble could easily be remedied with the use of static balances.

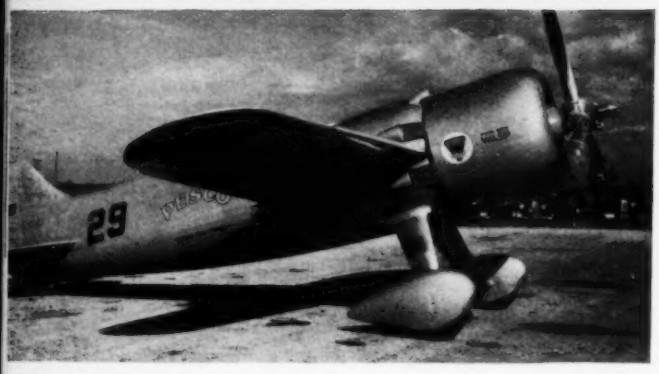
Well Cowled

Nothing has been spared in the design of the Crosby ship. Even the tail skid retracts. It is a development of Crosby's former racer in which he crashed and spent six months in the hospital. As far as enclosing the engine is concerned, Crosby has reached the maximum. His is the only one in the Menasco class with a complete exhaust manifold system, there being no exhaust stacks showing. One very small hole in the nose and the manifold outlet are the only openings in the cowlings.

All the modern features, such as skin-type oil radiators in the leading edge, brakes, split trailing-edge flaps and unique retracting gear have been incorporated. It has the highest wing loading of any ship at the races.

Russell Chambers' little job was a nice ship which had weathered several beatings before the ill-fated one. It was a high mid-wing airplane with the line of thrust just below the wing, which appears to be the most efficient position. It

S. J. Wittman's astounding monoplane (top) has a Curtiss D-12 engine and wings of constant chord. Lieutenant Wade's Miller HM-1 (below) is a two-seater version of the late Frank Hawk's *Time Flies*.



From top to bottom are Earl Ortman's Marcoux-Bromberg Special with Twin Wasp Junior engine; Roscoe Turner's victorious Laird (or Pesco Special) which has a Twin Wasp Senior; and the Pearson-Williams PW-1 with a supercharged Curtiss Conqueror.

lessens the wing's pitching moment and thus reduces the down load on the tail surfaces.

In a slightly higher category is the Bushey-McGrew Special, powered by a Menasco 160 h.p. C4S. This plane is the old *Bumble Bee*, the first of the Keith Rider planes, and is now done up in new lines. Its fuselage is all metal, with a wooden wing. Ralph Bushey, who supervised the engine installation, was the pilot of one of Larry Brown's racers when the engine fell out. Ralph stayed with the ship to the ground and was crippled from the accident.

Once the ship is off the ground the landing gear on the *Bumble Bee* snaps up before you can count three. It is the only plane with a straight axle running from wheel to wheel and is reminiscent of the war-time crates.

The smallest plane of the bunch was the Light Airplane Developers' *Flaggship*, designed by a Mr. Flagg, who had the ship at Cleveland last year with Tony Le Vier doing the flying. Walter McClain nosed the plane over on landing it this year and thus his life was spared by not entering it in further competition. The photo of the job [at the foot of the first page of this article.—ED.] speaks for itself. The cantilever landing gear is interesting, and—lo and behold!—an English product is up forward . . . a 90 h.p. Pobjoy Niagara.

Here is a brief résumé of some of the wing loadings: *Goon*, 25.5 lb./sq. ft.; *Eight Ball*, 24 lb./sq. ft.; Crosby, 30 lb./sq. ft.; *Chambermaid*, 24.5 lb./sq. ft.

The Thompson Trophy Race

At the Oakland meet this year Earl Ortman in his Marcoux-Bromberg and Col. Roscoe Turner in his Pesco Special ran a nip-and-tuck race from start to finish for all of 200 miles, and Ortman barely won by a nose. That race will never be forgotten. With those same two pilots once again competing with one another in the Thompson Race on Labour Day, and with such other pilots as Steve Wittman (who was way ahead of Ortman and Turner last year until his prop hit a bird), Joe Mackey in a former-Thompson-winning Wedell-Williams, and Leigh Wade in Frank Hawks' *Time Flies*, there was bound to be some excitement. Then there were Art Chester in *The Goon*, Joe Jacobsen in the *Eight Ball* and Harry Crosby in his Crosby Special. Tony Le Vier would have also been in there if he had not damaged his plane in a bad landing after the Greve event.

The 1938 Thompson Race was extended to 300 miles, or 30 laps around a 10-mile course, and from the gun it appeared as though it was going to be a duplicate of the Oakland meet, for Earl Ortman stepped right out in front, with Turner close behind. As they wound around the four pylons on the course the race looked like a formation flight, with Turner a little above Ortman, his propeller buzzing just a few feet from the Marcoux-Bromberg's rudder. Their speeds were steadily increasing from 244 m.p.h. to about 270 m.p.h. when they reached the sixth lap. During this time Roscoe was closing in inch by inch as they skimmed along the tops of the trees. Had something fallen off Ortman's racer, Turner would have received it in his lap.

On the sixth lap the excitement waned just a bit as Ortman became over-anxious to win the race and accidentally cut a pylon. To correct his mistake cost him first place, but the race had only just begun and he once more settled down to try to close in on Turner. In the meantime the other racers were battling it out to get third position. Harry Crosby had a little trouble and was a lap late in starting, and therefore could not be considered a threat; nor could Joe Jacobsen, who was just staying to get the last-place pot. But Art Chester, in his "half-pint" racer, and Joe Mackey, with his big Hornet pounding away, were making a close race of it, though they could not keep up with Wittman and Leigh Wade.

Crosby held on for ten laps and then had to quit, and as the twentieth lap came up the grind began to tell on Art Chester's steed. He, too, was forced to land. All the others went on to finish. Each lap Roscoe raised his average speed a notch or two, from 244 m.p.h. on the first to 282 on the tenth. After reaching 282 he hung around there for several laps, and as hard as Earl Ortman tried he could not come up to that speed. His speeds were averaging around 275 m.p.h., and cutting the pylon brought his total average way down to 269 m.p.h. At the finish line Turner was, of course, first to cross, with Ortman second. Wittman was third in that old ship of his, and fourth place went to Leigh Wade.

Wing Loading 50 lb./sq. ft.!

Roscoe Turner's Pesco Special has been previously described, in some extent, in *Flight* in the past. A few changes have been made. Now, if one can imagine flying on a 10-mile closed course, always in a bank, a few feet from the ground, with seven other ships in the same line of flight, just barely missing the towering pylons, and still being able to reach a speed of over 283 m.p.h. over a distance of 300 miles, one can readily see what a magnificent plane is Roscoe Turner's. This year he added wheel pants and took the oil radiator from the belly and placed it on the right side of the ship. With a very full load, wing loading amounts to about 50 l./sq. ft.!

Earl Ortman's plane, which was originally designed by Keith Rider, has had minor improvements added lately, the most important being the sham wooden structure built around the all-metal fuselage just aft of the cowling to give better streamlining. It proved successful and gave the ship many more miles of speed.

Steve Wittman's is another old-timer with slight ramifications here and there.

Leigh Wade's craft is the rebuilt plane made famous by the late Frank Hawks. It has been developed into a fighter for export by the Military Aircraft Corporation, and its performance in the race is ample proof of its manœuvrability and high speed. In place of the famous retractable cockpit, an enclosure has been built on. The ship had been designed for high-altitude work, and with this in mind it should do 75 m.p.h. faster on the straight-away and at altitude than it did in the Thompson.

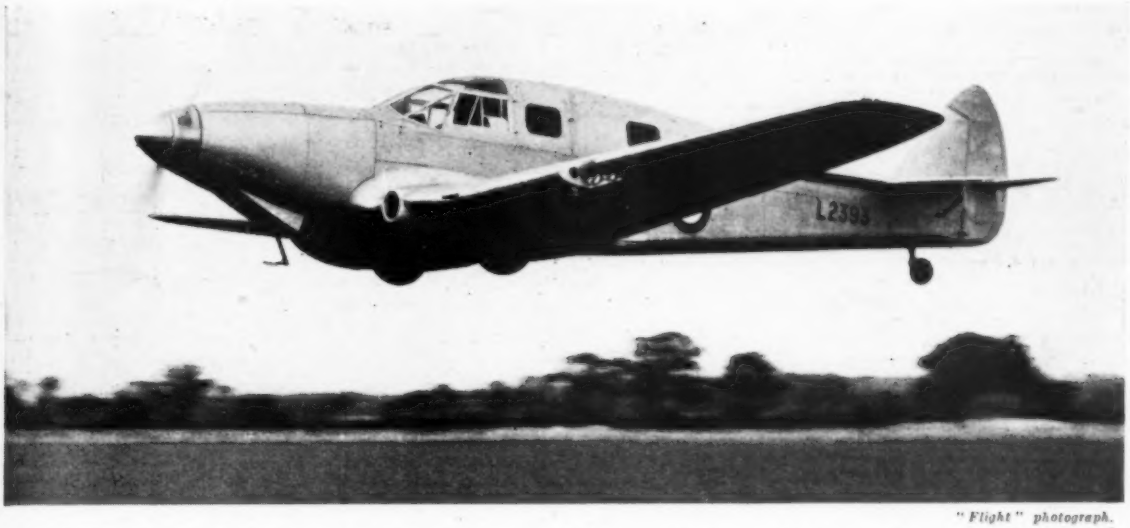
Most of the planes remained after the races to take in some extra money by performing for the production of the picture *Tailspin*. For those who were not able to see the National Air Races this year it might be well to go and see this new picture when it is released, for it will show the event from almost start to finish.

ROBERT C. MORRISON.

SERVICE AVIATION

Royal Air Force and Official Announcements :

Fleet Air Arm News : Military Aviation Abroad



"Flight" photograph.

SANS TURRET: The D.H. Don appears in a new form—as a fast communications machine, for which purpose it is now being supplied in quantity to the R.A.F. With the 525 h.p.-for-take-off Gipsy Twelve (or Gipsyking, as it is designated for Service purposes) the Don has a top speed of 213 m.p.h., and cruises at 192 m.p.h. with 62 per cent. power at 11,000ft. One of the two engine-cooling ducts can be seen in the leading edge.

A Visit to France

A ROYAL Air Force mission left for France last Sunday on a visit to the French Air Force. The visit, which will last until the coming week-end, is in return for that paid to the Royal Air Force by the French Air Force last June.

The members of the mission are Air Chief Marshal Sir Cyril Newall, G.C.B., C.M.G., C.B.E., A.M., Chief of the Air Staff; A. V.-M. W. S. Douglas, M.C., D.F.C., Assistant Chief of the Air Staff; Group Capt. N. H. Bottomley, C.I.E., D.S.O., A.F.C., Bomber Command; Group Capt. A. H. Orlebar, A.F.C., Officer Commanding Royal Air Force Station, Northolt; Sqn. Ldr. J. M. J. C. J. I. Rock de Besombes, of the Air Ministry; and Flt. Lt. H. Eeles, personal assistant to Chief of the Air Staff.

The party travelled in the Air Council's D.H. 86B, leaving Hendon after lunch on Sunday and arriving at Le Bourget at about 4 p.m.

Air Minister's Appreciation

THE Secretary of State for Air, Sir Kingsley Wood, has addressed the following message to Air Officers Commanding-in-Chief, Royal Air Force Commands at home, and to Air Officers Commanding Overseas Commands:—

"Now that it has been possible to modify the special arrangements which were necessary during the recent period of international tension, I wish to express the appreciation of the Air Council and my own to all ranks of the Air Force for the prompt and enthusiastic response that was made.

"A special debt of gratitude is due to the personnel of the Auxiliary Air Force and the Observer Corps, who were called at very short notice to leave their homes and their daily occupations to man the fighter and balloon squadrons and the air defence observer system. Some of them had to leave their civil employment. I do not doubt that employers who had to release members of the Auxiliary Air Force and the Observer Corps for this vital national service will take them back into their employment in the capacity in which they had been working before the emergency.

"I should also like to add my thanks to the civilians of all ranks at the Air Ministry and at the Royal Air Force establishments for their loyal devotion to duty.

"The general response, whether for service in the air or on the ground, could not have been more complete or more convincing."

Royal New Zealand Air Force Expansion

PLANS for the establishment of a stronger New Zealand regular Air Force consisting of 100 officers and 900 airmen are disclosed in the annual report of the Dominion's Air Department, just issued by the Minister of Defence (the Hon. F. Jones).

The scheme provides for two Air Force Squadrons, a Flying Training School, and a depot for storage and repair of equipment. The regular personnel will also act as instructors for the Territorial Air Force and Reserve.

This Air Force Reserve is to be built up as the result of an agreement with the Royal New Zealand Aero Club, which undertakes to provide 100 selected candidates to be trained for service in the Air Force in emergency. Provision is also being made for the creation of Territorial Air Force Squadrons at Wellington, Auckland, Christchurch and Dunedin.

The report stresses the importance of encouraging young New Zealanders to join the Royal Air Force in Great Britain. "Until this year," it states, "applicants for commissions paid their own passages to England and took the risk of not being selected on arrival, but by an arrangement with the Air Ministry the system has now been changed and candidates are selected in New Zealand and their passages paid." The present strength of the Royal New Zealand Air Force is 37 officers and 302 men in the Regular branch, 13 officers and 106 men in the Reserve, and 73 officers and 75 men in the Territorials.

Balloons Over London

A DEMONSTRATION of barrage balloons over London was given last Saturday, and some twenty-five were flown from their mobile winches in various places—often from comparatively small spaces between buildings.

Great public interest was taken in the inflation and ascent of the balloons, and this ought to bring in more recruits for the squadrons.

There was a stiff breeze. Five of the balloons broke loose, and the trailing cables did some minor damage to chimney pots, one causing an electrical short on the railway near Belvedere, Kent. One of the fugitives nearly reached Denmark but finally sank in the sea. The other four were quickly recaptured.

R.A.F. Benevolent Fund: Lord Wakefield's Gift

THE expansion of the Vanbrugh Castle School, which exists for the sons of deceased airmen, has been made possible through a very generous gift by Viscount Wakefield of Hythe to the Benevolent Fund. This has enabled the Council to purchase the property adjoining Vanbrugh Castle, which was presented to the Fund in 1920 by Mr. Alexander Duckham. The inclusion of the adjoining property will afford accommodation for a considerable increase in the establishment.

This gift comes at a time when it will be of the greatest value in view of the growing waiting list resulting from the expansion of the Royal Air Force. Quite recently Lord Wakefield presented the Benevolent Fund with £10,000 in order to found a benefaction for

SERVICE AVIATION (CONTINUED)

the academic or technical training of the dependents of R.A.F. personnel and for young officers or airmen who have left the Service.

The fourth council meeting of the Fund for the year 1938 was held on Wednesday of last week, with Lord Wakefield in the chair.

The Air Officer Commanding, Maintenance Command, was allotted a seat on the Council, thus completing the representation of all Home Commands.

The Council were informed that the total expenditure on relief for the Council year up to date is £13,477, representing an increase of £1,663 over the same period a year ago. This figure does not include the contribution of £250 per month made to the Officers' Association for the benefit of R.A.F. Officers who served during the Great War nor does it include expenditure on the Vanbrugh Castle School, which amounts to an average of £200 per month.

It was reported that there had been a very excellent response from all ranks of the Royal Air Force to the invitation to subscribe to the Fund, resulting in over £1,000 from Home Commands alone in the first quarter. This response had proved most timely in view of the recent emergency which threatened to deprive the Fund of the proceeds of Empire Air Day and other R.A.F. Displays upon which it is so dependent.

Compared with 1937, the donations received were less by £10,000, mainly on account of the withdrawal of the R.A.F. Display, Hendon, and a reduction in the amount of the proceeds of Empire Air Day available for the Fund.

Territorial Army Changes

THE War Minister, Mr. Hore-Belisha, has announced a drastic reorganisation of the Territorial Army. This does not affect the anti-aircraft divisions, which number five, as only last June a higher command for this force was appointed. Mr. Hore-Belisha stated that the then strength of that force, 43,000, was to be more than doubled, the object being a strength of 100,000.

Balloon Squadrons for the Provinces

DEPOTS for recruiting and training men for balloon barrage squadrons of the Auxiliary Air Force are to be formed at a number of cities, including Birmingham, Bristol, Manchester, Liverpool, Hull, Newcastle, Plymouth, Glasgow, Southampton and Cardiff.

Annual Dinners

THE annual dinner of the Old Cranwellian Association will be held in the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2, on Saturday, November 19, at 8 p.m. for 8.30 p.m. Any member of the association who has not received an invitation, and who desires to attend, should communicate with the Secretary, Old Cranwellian Association, Royal Air Force College, Cranwell, Sleaford, Lincs.

The annual general meeting of the R.A.F. Education Officers' Association will be held in the Hotel Great Central, Marylebone, on Friday, October 14, commencing at 2 p.m. It will be followed by the annual dinner of the Service in the Hotel Great Central, Marylebone, at 7 p.m. for 7.30 p.m. Mr. W. M. Page, C.B.E., M.A., Director of Educational Services, will be in the chair. Particulars may be obtained from the dinner secretary, Capt. W. J. O. Studd, A.I.Mar.E., No. 2 Air Armament School, Eastchurch, Sheerness, Kent.

The annual reunion dinner of the Royal Air Force 28th Squadron Old Boys' Association will be held on Saturday, October 22, at The White Hart, 39, High Holborn (opposite Chancery Lane), London, assembling at 6 p.m. Tickets (3s. 6d.) are obtainable from the hon. secretary, Mr. C. T. Hodges, 24, Anson Road, London, N.7.

The first reunion dinner of Nos. 72 Squadron R.F.C. and 72 (F.) Squadron R.A.F., will take place at the Royal Air Force Club, 128, Piccadilly, London, to-morrow, October 14. Full particulars and tickets can be obtained by application to Capt. A. G. Lamplugh, The British Aviation Insurance Company, Limited, Lloyd's Building, London, E.C.3 (Telephone: Mansion House 0444).

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—Flt. Lt. Kenneth Darleigh Salmon (pilot, flying solo) lost his life in an accident which occurred at Farnham, Surrey, on October 5, 1938, to an aircraft of the Royal Aircraft Establishment, South Farnborough, Hants.

P/O. Alistair Lilburn MacEwen, Cpl. Frank James and A/C.1 Kenneth Adrian Clark lost their lives in an accident which occurred at Plynlimmon, near Llandidloes, Montgomeryshire, on October 6, to an aircraft of No. 226 (B.) Squadron, Harwell. P/O. MacEwen was the pilot, and Cpl. James and A/C.1 Clark the other members of the crew.

With reference to the disappearance on October 6 of an aircraft of No. 215 (Bomber) Squadron, Honington, Bury St. Edmunds, the Air Ministry announces with regret that as investigations have failed to find the aircraft and the occupants it must now be accepted that the following R.A.F. personnel lost their lives on that date: F/O. Douglas Aubrey Hamilton, P/O. Roland Noah Haynes (pilot), P/O. Thomas Ian Stewart Munro, A/C.1 Trevor Prowse, and L.A/C. Charles Selby Lodge.

Royal Air Force Gazette

Royal Air Force

General Duties Branch

The following Flight Lieutenants are granted permanent commissions in that rank on the dates stated:—N. Hope, W. M. Keddie, H. M. Russell, K. D. Salmon, H. Stanton, N. W. Wakelin (August 29); G. N. Amison, H. W. Dean, G. R. Howie, E. T. Smith (September 23).

The following Flight Lieutenants promoted to the rank of Squadron Leader, October 1, 1938:—W. D. Butler, R. Chadwick, N. C. Odbert, W. R. Hartwright, R. C. Dawkins, D. McC. Gordon, A. R. Sarel, E. H. Bellairs, L. H. Anderson, I. A. Critchley, J. Constable-Roberts, W. C. Sheen, A. Mitchell Rodgers, P. B. Coote, G. D. Stephenson, G. F. Overbury, J. N. Jefferson, N. B. Norris, L. J. Crosbie, A. H. Seymour-Lucas, T. U. C. Shirley, W. P. G. Pretty, E. J. P. Davy, E. C. Bates, R. B. Harrison, D. M. T. Macdonald, R. B. Wardman, W. E. Coope, K. P. Lewis, I. C. Bird, J. B. T. Whitehead, H. N. G. Ramsbottom-Isherwood, H. V. Satterly, E. D. Elliott, G. A. Bolland, H. F. Chester, J. W. C. More, C. H. Smith, M. H. Kelly, M. B. Edwards, H. W. Mermagen, R. B. Lees, D. D. Christie, R. L. Kippenberger, U. Y. Shannon, P. J. Polglase, K. B. B. Cross, R. G. Harman, J. Whitehead, R. B. Dashper, J. N. Baxter, A. F. McKenna, J. A. Tester, A. H. Button, V. C. F. Streatfeild, B. E. Lowe, C. E. J. Baines, L. M. Hooper, P. Haynes, G. F. W. Heycock, C. E. Littler, G. E. Valentine, D. G. Morris, G. W. P. Grant, W. A. Richardson, H. I. Dabinett, D. B. D. Field, N. C. Hendrikz, R. C. H. Crosthwaite, H. B. Wrigley, R. N. Clarke, N. C. Walker, J. A. S. Brown, A. H. Garland, H. A. Simmons, R. I. G. Macdougall, A. W. S. Matheson, D. M. Lynch-Staunton, C. G. Skinner, B. H. Jones, W. A. J. Satchell, W. R. Wills-Sandford.

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—J. L. Crosbie (June 15); H. V. Hoskins (September 19); J. D. T. Revell (October 3).

Wing Cdr. B. L. Huskisson, D.S.C., relinquishes his permanent commission on appointment to the Air Branch of the Royal Navy (September 1).

Equipment Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (October 1):—A. M. Reidy, L. W. Park, T. I. Iliff, M. S. Shapcott.

Accountant Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (October 1):—R. W. L. Glenn, H. J. Titherinton, R. W. Collinson, E. Smith. Wing Cdr. K. R. Money, O.B.E., is placed on the retired list at his own request (October 1).

Medical Branch

Flt. Lt. R. A. Cummings, M.B., Ch.B., is transferred to the Reserve Class D (October 1).

Chaplains Branch

The Rev. D. M. Rowlands is granted a short service commission with the relative rank of Squadron Leader (September 19).

Princess Mary's Royal Air Force Nursing Service

The following Staff Nurses are promoted to the rank of Sister on the dates stated:—Miss D. M. Schilling; Miss E. M. Wright (September 1); Miss E. N. Marshall (September 20); Miss G. J. Hawkins (September 21).

Auxiliary Air Force

General Duties Branch

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—Flt. Lt. J. S. Feather relinquishes his commission on completion of service and is permitted to retain his rank (July 10).

No. 604 (COUNTY OF MIDDLESEX) (FIGHTER) SQUADRON.—Flt. Lt. H. C. Hebard relinquishes his commission (July 28).

No. 910 (COUNTY OF ESSEX) (BALLOON) SQUADRON.—P. H. Tanner is granted a commission in the rank of Flight Lieutenant (July 5).

Auxiliary Air Force Reserve of Officers

General Duties Branch

H. C. Hebard is granted a commission as Flight Lieutenant in Class A (July 28).

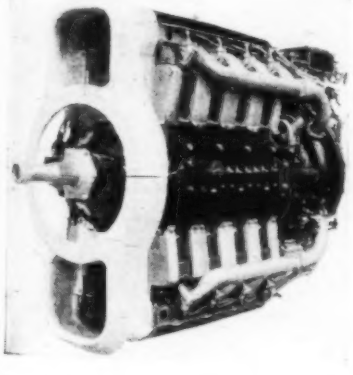
Owing to the greatly increased length of these lists, as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

A breezy impression of the Short-Mayo composite aircraft taking off from the Tay.

SEAPLANE DISTANCE RECORD FOR BRITAIN

"*Mercury's*" 6,045-*mile Flight to the Orange River*

AS an alternative to another Atlantic flight, Imperial Airways and the Air Ministry decided some time ago to use *Mercury*, upper component of the Short-Mayo composite aircraft, for an experimental flight from Dundee, Scotland, to Capetown, South Africa. It was hoped that she would break not only the world's long-distance record, held by a Russian A.N.T. monoplane, which flew 6,305 miles from Moscow to San Jacinto, California, but the distance record for seaplanes then standing to the credit of a Diesel-engined Dornier Do.18 flying boat, which made the 5,220-mile trip from Start Bay, Devon, to Caravellas, Brazil, in 43 hours. The crew selected were Capt. D. C. T. Bennett, who flew *Mercury* on her transatlantic flights, and First Officer I. Harvey, who is equally experienced as a wireless operator and as a pilot, and who assisted Capt. Bennett in both capacities. Incidentally, he is probably the only officer in Imperial Airways who has joined the company twice, first as a wireless operator and then as a pilot.



A sixteen-cylinder Napier Rapier engine as installed in *Mercury*. The maximum power is 395 h.p. at 6,000ft.

Mercury and *Maia* flew independently to Dundee on September 21 after a slight mechanical defect in the upper component had been remedied, the intention being to start the flight two days later. However, southerly winds were reported along the first 2,000 miles of the route, and it was decided to postpone the attempt until the following day.

Further delays were occasioned by the international situation and more impossible weather. One gale, on October 4, reached a velocity of 60 m.p.h. with gusts up to 80 m.p.h. This necessitated lashing as well as locking of the two components. The following day brought an improvement, and on Thursday, the 6th, although the wind was still quite strong, conditions were such as to warrant a start.

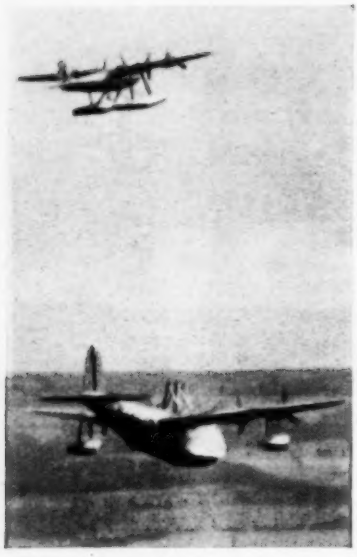
Pilot's Views

Just before take-off Capt. Bennett, wearing the blue service tunic of Imperial Airways, was interviewed by our correspondent. He expected that the flight would take a little over 40 hours and that he would fly for the greater part of the trip at 10,000ft., averaging between 145 and 150 m.p.h.—rather less than the normal cruising speed because of the need for fuel economy. Capt. Bennett said he would be crossing Heston Airport, where he would be timed by an official observer. By nightfall he expected to be over the South of France. He added that he did not like the idea of Spain, and would fly just off the coast. Flasks of coffee, milk, and soup were stowed on board and were to be taken at four-hour intervals. The Captain seemed uncertain whether or not he and his first officer would get any sleep. First Officer Harvey said he felt fine except for a cold which left him "firing on one cylinder."

Capt. D. C. T. Bennett, who commanded *Mercury*. He was assisted by First Officer I. Harvey.

According to our correspondent, the separation was made at 1.20 p.m. It was not witnessed by Imperial Airways' officials on the quay at Newport, whose first indication of the successful parting was the sudden appearance of *Mercury* about 6,000ft. up over the River Tay. The power loading at the moment of separation, with 2,135 gallons of petrol in the tubular spar and float tanks, was about 20 lb./h.p., and the wing loading about 45 lb./sq. ft.

Mercury set off on a SSW course, and *Maia* dropped low over Newport before landing on the Firth of Tay. On landing from *Maia*, Capt. Wilcocks and Major Mayo said that the separation had taken place at 4,700ft. six or seven miles north of Dundee between the city and Forfar. Clouds prevented it being made over Dundee Law Hill, as



An impression of the actual separation a few miles north of Dundee. Major Mayo was an observer in the lower component.

scheduled. Near Hatfield she was forced down to about 3,000ft. because of ice formation, but had climbed back to 5,000ft. by the time she crossed the coast at Newhaven at 4.13 p.m.

After being in the air for just over ten hours she had covered about 1,635 miles, and Capt. Bennett reported his position as 34 deg. 20 min. N. and 6 deg. 20 min. E. His height was 10,000ft. The bearings indicated that the machine was slightly north of Melghir Lake and that Algeria had been crossed. Radio stations on or near the route reported next day that *Mercury* had crossed Temassinin, Sahara (2,100 miles), Ghat, Libya (2,750 miles), Kano, Nigeria (3,185 miles), and Makakou (4,035 miles). Conflicting reports—possibly due to doubtful radio reception—make it impossible to quote accurate passing times at these places (one figure given in a newspaper worked out at an average speed of 322 m.p.h. !). However, the attainment of Makakou marked the completion of about two-thirds of the journey in just over 26 hours.

According to Capt. Bennett, the fuel situation had become somewhat doubtful by the time he had covered half the distance. Severe tropical thunderstorms in West Africa made it highly improbable that the machine could reach Capetown, and he considered coming down at Luderitz Bay. However, by continued throttling for economy it was possible to reach the mouth of the Orange River at 7.25 a.m. *Mercury* came in to alight through a cloud of flamingoes, and Capt. Bennett was watchful for hippopotami.

While taxying the machine grounded comfortably on a sandbank and was refuelled prior to her departure for the Cape, which was reached at 4.35 p.m. G.M.T.

On landing, Capt. Bennett said that he had encountered icing conditions over Europe, which forced *Mercury* far below her optimum altitude. Crossing the Atlas Mountains in North Africa by moonlight, he could see the peaks below. Headwinds opposed *Mercury* all the way down Africa, and by 3 a.m on Friday the speed had dropped to 128 m.p.h., but rose again to 146 m.p.h. by noon, giving an average for the first 2,100 miles of about 140 m.p.h.

The Captain said that the flight was an unqualified success from the viewpoint of composite aircraft development. The following data on *Mercury* may be of interest: Span, 73ft.; length, 50ft. 11½in.; float track, 14ft. 6in.; wing area, 611 sq. ft.; total fuel capacity, 2,400 gal.; maximum cruising speed, 180 m.p.h. approx.

The engines are four Napier Rapier Series VIs, which have sixteen cylinders each arranged in four banks in the form of a letter H. During the Atlantic crossing these same engines each consumed only 13¾ gal. of fuel per hour and 4 pints of oil. The makers claim that these low consumptions are a feature of the in-line engine, which has a large number of small high-compression cylinders and runs at a high engine speed with a great economy in frontal area. The rated and maximum powers of the engine are respectively 370 h.p. at 4,750ft. and 395 h.p. at 6,000ft.

The radio preparations for the flight are not without interest. It will be remembered that the Fairey long-range monoplane which set up a new world's long-distance record in 1933 by flying 5,341 miles from Cranwell to Walvis Bay took a route similar to that used by *Mercury*, but, apart from that, the stations concerned were comparatively unfamiliar with flights of this importance. Besides taking radio bearings, *Mercury's* crew had to receive constant weather information by wireless. As the wavelengths used by each station varied considerably, it was necessary to come to an arrangement about the wavelength to be used. Moreover, as many of them keep limited watch hours, it was imperative to give each one the times at which *Mercury* expected to pass in their neighbourhood.

Over the Sahara there are a number of short-wave stations, mostly at military posts, outposts such as Ouargla (5.02E, 30.03N), Fort Flatters, Tamanrasset (5.30E, 22.50N), and, just before the route crosses into British territory, Zinder.

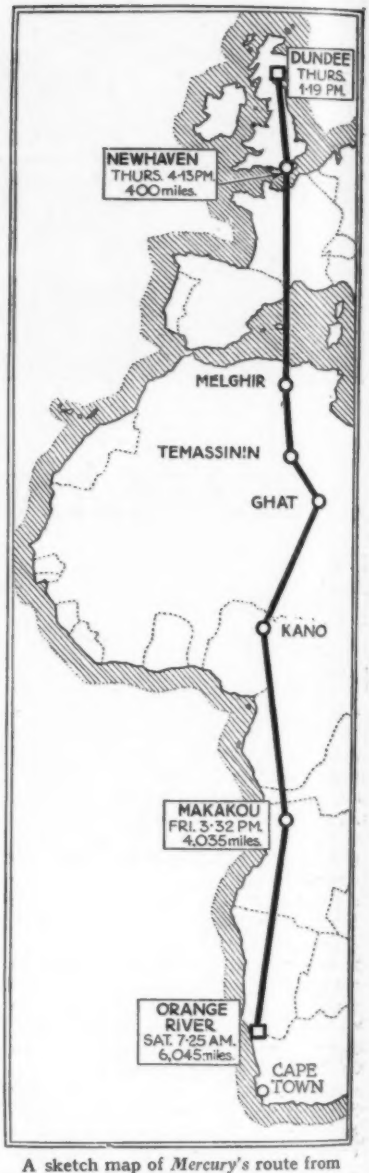
Working the Stations

Over the more southerly districts the route crossed Imperial Airways' Khartoum-Lagos line, and communication could be established with Fort Lamy (just over the Nigeria-Cameroons border) and Maiduguri and Kano in the northern provinces of Nigeria itself. Duala, in the French Cameroons, was the first coastal station to be picked up, and from then on, over the jungle lands as far as the Belgian Congo, marine stations were available as well as the aircraft stations used by the French and Belgian weekly services which operate down the West African coast.

Then for the 900 miles of the route in the Portuguese West African area there were seven stations along the coast, the chief of them being Loanda, about halfway between the mouth of the Congo and Benguella. On the route over South-west Africa Walvis Bay was an obvious station, and thereafter the excellent wireless facilities provided for South African Airways' Kimberley-Upington - Keetmanshoop - Mariental-Windhoek services were available.

Long-range short-wave communication was also possible with stations in England and on the regular Imperial Airways' Cairo-Durban route — roughly parallel to *Mercury's* route 1,500 to 2,000 miles away to the east.

Mercury's equipment includes a combined short- and medium-wave transmitter for telegraphy and telephony, developed by Marconi; this is continuously adjustable for wavelengths from 15 to 200 metres in five ranges, and from 550 to 1,100 metres in one range. Two receivers are also carried—one for short, intermediate and medium waves, and one for medium-wave direction-finding. There is also a visual indicator attachment for homing. There are thus two receivers available for ordinary reception on medium wave. Direction-finding circuits are also provided on the upper medium waveband on the first receiver, thus giving an alternative direction-finding channel.



A sketch map of *Mercury's* route from Dundee to the mouth of the Orange River.

After spending the week-end at the Cape, *Mercury* was due to fly to Durban on Tuesday for a checking-over before returning to England towards the end of this week.

Some notes on items of *Mercury's* equipment appear on page 328.

COMMERCIAL AVIATION

"Flight" photograph.

IN THEIR UNDERCOATS: Two D.H. Albatrosses, Imperial Airways' *Frobisher* and one of the Air Ministry long-range jobs, seen out together at Hatfield last week.

THE WEEK AT CROYDON

From "A. Viator's" Airport Window

"EVEN if they haven't all cancelled their services during the gale," said His Excellency, "I should not dream of travelling by boat this weather."

He was talking to the Airport, booking his seat to the Continent, as usual, for His Excellency is a connoisseur of the fine things of life, good wines, for example, and air transport.

He knew, of course, that however strong the wind, it makes precious little difference to a modern aeroplane once it has got above the clouds. Look back, preferably in your bound volumes of *Flight*, to accounts of the great gales of ten or fifteen years ago and you will be surprised how bravely the aeroplanes of even those days faced them and how frequently they got through.

They got through, but only by bucketing along below the clouds near to Mother Earth and collecting all the bumps in the skies.

To-day, except for the first and last few minutes of an air journey, you get a perfectly smooth and pleasant trip, quite probably in bright sunlight, with blue sky above and fleecy white cloudscape below. But I am preaching to the converted.

Windy Corner

When the gale was at its very worst, on Tuesday of last week, you may imagine with what force it swept across the Airport. One of its tricks was to lift the tin lids off some of our famous trenches and deposit them in the Airport Hotel gardens with a clatter sufficient to make nervous folk do a dive for the cellars. Then it was that "tenders" were sent out to bring "ships" into port; tractors and their crews rushed out to some machines to tow them to the tarmac. I saw one big craft, its ensign flapping bravely, being towed backwards to the arrival platform—a safe but inglorious proceeding, like some political expedients.

From my "Window in Thrums," which overlooks the tarmac, I see quite a lot of life, including half-dead society folk returning from Continental whoopee. (A window, by the way, may be described as "in thrums" when it is all a-quiver and thrumming, owing to being a Government contract job and on account of large aeroplanes running up just below.) One notices, for example, at 08.45 to 09.10 hours, that British, French, Dutch, Belgian and Swedish aeroplanes, to mention but a few, are all setting off for long-distance flights. There are two Dutch Douglases at 08.45 which keep the K.L.M. traffic people busy. Soon after 09.00 hours things ease off a bit and the local crows get a chance to settle on the tarmac.

Lastly, passengers from Paris, regardless of age or beauty, all wear brand new hats on arrival, often so far in advance of British fashion that the uninitiated cannot believe the things are genuine headwear and hazard a guess that the ladies have forgotten to remove last night's gala paper caps. Husbands and such, meeting their wives and so forth, frequently regard them with a cold, fishy eye under the impression that they are total strangers.

Yesterday, from my window, I saw a little incident illustrative of the fatherly care of the Air Ministry for its employees, lest peradventure they should overwork themselves. A chap carrying a long pole at the slope marched across the aerodrome, followed by another with a red and white flag on a stick. Evidently the pole was a totem pole, probably with a Senior Civil Servant carved on it in effigy, for the pole-bearer stuck it in the ground and knelt before it whilst the standard bearer stood approximately to attention. Then they marched back to their teas, leaving me wondering why the flag should not have been on the pole. It is, however, good for unemployment if two men can do one job, so we mustn't grumble, I suppose, being mere taxpayers.

Capt. S. D. Slocum, of British Airways, Ltd., had an unusual adventure when upon his lawful occasions as a commercial air skipper recently.

He left Heston on Thursday of last week with nine passengers in one of the British Airways' Junkers Ju.52s, on the wings and fuselage of which large Union Jacks had been painted. He reached Algiers the same evening and went on to Casa Blanca next day, where he received instructions to return. On the way back, over Minorca, he was fired at by anti-aircraft batteries belonging to the Government forces (who seem to show about as much respect for the British flag as does the other party). Several fragments struck the machine, and Capt. Slocum had to put up a flying impersonation of a woodcock. He sent out an SOS, which was picked up by the British ship s.s. *Blairlogie*, which stood by, happily without having to do any salvage work.

During an interval between diplomatic flights of extreme importance and record-breaking long-distance flights, a British Airways' Lockheed 14 has been seen over Croydon making radio beacon tests.

A. VIATOR

Commercial Aviation

Personalities on the British Airways Lisbon survey flights: (left to right) Cdr. V. E. Flowerday and Cdr. E. G. L. Robinson, the pilots of the Lockheed 14s; Mr. A. C. Campbell-Orde (operational manager), Maj. J. R. McCrindle (managing director), The Hon. Clive Pearson (chairman), Mr. W. D. Roberts (vice-chairman) and Mr. Gerard d'Erlanger (director).

Lisbon Survey Flights

BRITISH AIRWAYS, last week-end, completed two survey flights over the Lisbon route preparatory to the inauguration of their passenger and mail service between England and Portugal. This, of course, is the first stage of the route to West Africa which is to be developed by British Airways and eventually extended across the Atlantic to South America.

Two Lockheed 14s, piloted by Cdr. E. G. L. Robinson and Cdr. V. E. Flowerday, left Heston at 8.24 a.m. last Friday. One flew direct to Lisbon and landed at Cintra Aerodrome at 2.53 p.m. after a non-stop flight of 6 hr. 29 min. for the 1,043-mile journey against a head wind of 40 m.p.h., giving an average ground speed of 160 m.p.h. According to a pre-arranged programme, the other landed at Bordeaux before proceeding to Lisbon. It made a direct flight back to Heston on Sunday, while the first machine, which flew non-stop on the outward journey, was due to return to Heston on Monday, calling at Bordeaux *en route*.

The Hon. Clive Pearson, chairman of British Airways; Mr. W. D. Roberts, vice-chairman; Major J. R. McCrindle, managing director; Mr. Gerard d'Erlanger, a director; and Mr. A. C. Campbell-Orde, operational manager, travelled as passengers. Mr. W. D. Roberts has recently returned from South America, where he was in charge of a special mission sent out by British Airways to discuss with the Argentine and Brazilian authorities the proposed air service between Great Britain and South America

Further experimental flights between London and Lisbon are to be made.

Short Landplanes

AT the time when Capt. Balfour announced in Parliament that new large landplanes would shortly be in process of manufacture for special civil work, it was not officially mentioned that the Short Company had received, or were to receive, an order for three machines. Work has now begun on this order, and it is possible to give some more complete information about the new types.

All three will have a gross weight of approximately 71,000 lb. (31.7 tons) and will be fitted with four engines, presumably the new Bristol sleeve-valve Hercules, which give 1,375 h.p. each. Two of them will be designed to fly at an operating height of 10,000ft., while carrying 18 passengers and 3,000 lb. of mail and freight, while the other is to be used for operations with a similar load at any height between 20,000ft. and 25,000ft.

This third machine is, consequently, the most interesting, and it is expected that it will cruise at 250 m.p.h. with a top speed considerably in excess of this figure. The range of all three will be about 3,000 miles when calculated against a head wind of 30 m.p.h., so that two-stage journeys will be possible from London to India, West Africa and South America, and non-stop runs to all the more distant cities in Europe. More important still, this range will permit non-stop flights over long sections on the Empire routes. For instance, the distance between Singapore and Darwin is 2,333 miles, while that between Darwin and Melbourne is only about 2,000. In view of the work involved, it is not to be expected that these machines can be ready until some time in 1940.

The order is particularly interesting because it is some time since the Short Company has built anything other than the boats which have been so extremely successful both in design and operational characteristics.

The first of the eight strengthened long-range Empire boats is due to emerge from the Rochester shops within the next few weeks, and, as " opposite numbers " to the big landplanes already mentioned, there are three very much larger flying boats on order. These will each have a gross weight of some 33 tons and will also be powered with four Bristol Hercules engines.

Meanwhile, four of the long-expected A.W. Ensigns are now ready for service and the first, which has completed its acceptance trials, is now at Croydon for chairing and furnishing.

Another Atlantic Phase

LAST week the first Atlantic Albatross was due to be taken over by Imperial Airways for the 100 hours of flying which will be done before it is sent over on its Atlantic crossing. There seems to be some doubt whether this crossing will be made before the early spring, though the original idea was that of flying the machine across to Hattie's Camp, Newfoundland's new airport, whence it would be used for experimental winter flying on the other side.

Test flights have shown that the range of the Albatross is 3,180 miles in still air at a cruising speed of 212 m.p.h. It will thus have an ample reserve for any but the most exceptional conditions when carrying the stipulated 1,000 lb. of mail and a crew of four. The particular interest of this machine for Atlantic work is that of discovering whether winter flying can be continued over the northern route. For several months of the year the flying-boat bases are, as far south even as New York, made dangerous through ice, and the only chance of a winter Atlantic service seems to be that of using landplanes. Much smaller machines than the Albatross have been used successfully in Canada on snow-covered aerodromes, though, when the snow depth is more than a foot, it is usually necessary to change over from a wheel to a ski undercarriage.

The next of the Albatross series to be taken over by Imperials will probably be *Frobisher*, the first of the passenger-carrying versions, five of which have been ordered. When all of them are delivered they will be used on the long-distance European services, the most important of which is probably that to Zurich, on which Swissair have made a considerable reputation for themselves during the past few years.

Direction-finding Encyclopedia

" Wireless Direction Finding," by R. Keen; 25s. Iliffe & Sons Ltd., Dorset House, Stamford Street, London, S.E.1.

THIS third edition of a textbook which was originally published as long ago as 1922 under a slightly different title, must be the most complete and thorough exposition of the problems and developments of direction-finding wireless which has ever been produced.

From the point of view of the student of aircraft radio, in which technical advances are made almost daily, the material is just about as up to date as it could possibly be. Certain items of equipment, such as the Marconi ultra-short wave approach beacon with which experiments have been carried out at Croydon, have not previously been described in any detail. Other less conventional systems of direction finding, some of which may or may not come into general use, are also described in a special chapter, and these include various cathode-ray developments, particularly in their application to

COMMERCIAL AVIATION (CONTINUED)

radio and approach work, as well as the pulse direction-finder which has actually been produced by the Telefunken Company and is in use at at least one airport in Europe, and the American Simon Radioguide. It is interesting, too, to learn that work is going on in the development of a television beacon for direction-finding purposes.

Wireless Direction Finding may be primarily of interest to the student, but the text is essentially descriptive rather than mathematical, so that it may equally well be read by the operators and pilots who are concerned in the practical uses of available equipment. Three preliminary chapters are devoted to the theory of directional transmission and reception, but these chapters are so written that they form an easily understood introduction to the major problems involved. From the Bellini-Tosi system, which was introduced in 1907, the author goes on to explain the various errors which are apparent with the older type of direction-finding receiver, and then deals with the newer Adcock aerial system as applied both to normal and short wavelengths. It seems that there is still no means of combating the errors which are inseparable from the use of a small loop—the only direction-finding equipment capable of being carried in an aircraft.

A study of direction finding would be incomplete without an understanding of the points of practical navigation involved in its use. An entire chapter is devoted to map projection, and, later on, the methods used in beam flying, in making "ZZ" approaches, and in using a self-contained direction-finding unit are fully explained. The chapters both on position finding and on the various approach systems are sufficiently practical and up to date to be of immense value either to students of air navigation or to transport pilots. A final chapter is devoted to astronomical navigation as it is applied to direction finding. The author appreciates the fact that the position in the matter of blind landings (as opposed to blind approaches) is still unsatisfactory, and the chapter devoted to such developments deals with present-day methods rather than with the actual details of the apparatus used.

For the engineering student or research engineer who requires even more comprehensive information, there is a list of 600-odd references to all the important contributions in literature which cover the subject of direction finding.

The Sabena Accident

THOUGH little definite information is available at the time of writing, eye-witness accounts suggest that the Sabena Savoia-Marchetti which crashed near Dusseldorf on the Brussels-Berlin run last Monday may have broken up in the air. Sixteen passengers and the crew of four, including the pilot, M. van den Eynde, were killed. This was the machine in which the Lord Mayor of London had travelled from Croydon to Brussels the same day.

Q.6s for Lithuania

THE first air transport company to be formed in Lithuania, the Lietuvos Oro Linijos, recently ordered two Percival Q.6 machines, which have now been delivered to the Lithuanian Ministry of Communications. The first service will run from Kaunas to Palanga, and for the moment L.O.L. will concentrate entirely on the operation of internal airlines.

Both the machines were flown out to Kaunas by Lithuanian pilots. Each has accommodation for seven persons, including a crew of two, one of whom, sitting beside the pilot, is the radio operator. The wireless equipment consists of a Standard R.9 receiver and transmitter. On their arrival the machines were christened respectively *Stepas Darius* and *Stasis Girenas* by the President of the Republic.

Glasgow Municipal Airport?

GLASGOW may have a municipal airport, if and when negotiations between representatives of the Corporation and the Air Ministry bear fruit. Discussions have been temporarily suspended as a result of the international crisis. Sir Kingsley Wood had agreed to meet the Corporation to discuss the projects, and as soon as he is able to travel north the negotiations will be resumed.

It is said that the Corporation has a definite site in view, which will be available for development as soon as required. There is also a scheme for a local aircraft industry.

Compulsory De-icing

WITH effect from November 1, an amendment to A.N.D.13 makes it compulsory for the leading edges of wings, tail surfaces and control surfaces of all transport aircraft registered in the United Kingdom and engaged on scheduled services, to be fitted with approved de-icing equipment whenever reports available at the time of departure indicate the probability of ice-forming conditions being encountered.

Dunlop and Goodrich equipment is approved, while approved types of de-icing paste, used in accordance with the makers' instructions will also be acceptable. Applications for approval of such pastes, accompanied by reports of tests demonstrating their efficiency, should be made to the Under-Secretary of State, Air Ministry (C.H.2), Ariel House, Strand, London, W.C.2.

Trans-Canada

SINCE the last of the fleet of fifteen Lockheeds was delivered on September 20, it may be imagined that things will really begin to move on Canadian airlines. Until now the Government-supported Trans-Canada Air Lines have been running an experimental service between Vancouver and Winnipeg, and this section of the route was due to be opened for official mail carriage last month.

Later this year the operated route is expected to be extended to Montreal, where connections will eventually be made with the transatlantic services, and early in 1939 the route will be further extended to Moncton. Westward from Winnipeg the machines will fly an eight-hour schedule to Vancouver, with stops at Regina and Lethbridge, whence a feeder service will be run northwards to Calgary and Edmonton.

Work on the ninety-odd landing grounds has been going on now for years, and during the past eighteen months many of them have been equipped with lighting systems and two-way radio installations. Additionally, a weather forecast service is being established, and it should not be long before night flying is being done on the Montreal-Vancouver section.

Since the delivery of the first machine to Trans-Canada Air Lines in October of last year, the company has been busy in the work of training its pilots. It may be remembered that, of the fifteen machines, ten are Lockheed Fourteens and the other five are Electras. All of them have full-feathering hydromatic airscrews and special D/F loop arrangements, the installation being arranged in the transparent nose.

FOR LITHUANIAN SERVICES: As related above, these two radio-equipped Percival Q.6s were recently flown out to Kaunas for use on Lithuania's first airline—an internal one between the base and Palanga.

Commercial Aviation

BUSINESS as USUAL

Airline Operation in Nationalist Spain —Some First-hand Impressions

AS every lover of his country knows, the Spaniard is the most difficult person in the world from whom to obtain information, even if the imparting may be greatly to his own benefit. The extreme reticence, on both private and public matters, which is part of every Spaniard's make-up in dealing with anybody but a personal acquaintance, renders him a hopeless propagandist.

Thus, when trying to find out in Nationalist Spain what exactly was happening in the way of civil aviation, I was not surprised to learn that nowhere in London was information available. So I decided to go and get it for myself. In the Foreign Press Office at San Sebastian I learned that General Kinderland (who is Spanish, though his name sounds German), the Air Minister, was himself only in direct control of military aviation, while in the civil field a new air transport company, Iberia, had been formed more or less under the ægis of the Lufthansa.

As I had anticipated, the air was providing a welcome relief of pressure on the efficient, but heavily overcrowded, railways. As there was no airport at San Sebastian, however, I travelled on by bus to Burgos, where it was expected that the Ministry of the Interior would be able to introduce me to the management of Iberia. There I was informed that this company had two principal directors, one German and one Spanish. The latter's name was Don Daniel Araoz, Baron de Sacro Liria, and he lived in Salamanca, where the company had its main offices. Armed with an introduction to him, I set off there by train.

Don Daniel proved to be one of the most charming Spaniards I have ever met. He has been a director of four successive Spanish air companies, of which he considers Iberia by far the most efficient. The machines used are Junkers Ju.52s, since these had proved the best all-purpose machines available. Safe and serviceable, they have a good payload and sufficient speed to cover all the mainland routes in Spain in a few hours.

The System

Actually, the basis of the present system of airlines is a two-day route from Las Palmas, capital of the Canaries, right through to Palma, Majorca. The overnight stop is at Salamanca, where passengers sleep at the Grand Hotel, which is also used by Lufthansa passengers and crews on the line to Lisbon and South America. This main Iberia route is flown twice weekly, and also passes through Cape Juby, Sini-Fini and Larache (all in Spanish Africa), Seville, Burgos and Saragossa. In addition, there are daily local services between Seville, Salamanca, Burgos and Saragossa, daily connections from Burgos to Vittoria, connections every other day from Saragossa to Vittoria, and from Salamanca and Burgos to Valladolid. There is also a branch line running every other day between Seville and Tetuan, in Spanish Morocco.

Connections with other European countries are by Lufthansa from Salamanca direct to Marseilles, Geneva, Stuttgart and Berlin, and by Ala Littoria from Tetuan, Cadiz, Malaga and Majorca to Rome.

Routes now being operated from Nationalist areas.

The Ju.52 is a hardy machine that can be left out all night in any kind of weather without coming to much harm. For, naturally, Spanish airports are not yet up to very high standards. Runways are undreamed-of luxuries and the extensive airport buildings that we take for granted are only just beginning to appear. Many landing-grounds have been constructed all over the country for the use of military machines. These are a good start, and when the war is over it is hoped to develop most of them into first-class aerodromes for civil use.

Traffic is heavy and nearly all the services are full. Few army officers travel, since these can fly for nothing in military machines. The bulk of the passengers are Government and Civil Service officials and Spanish and foreign business men and technicians. The military authorities at present have their headquarters at Saragossa, which is nearest to the principal fronts. The other Government Departments are divided between the principal Nationalist towns—Burgos, Salamanca, Bilbao, Seville and Vittoria—partly so that each shall be near its own principal sphere of action and partly since none of these towns is large enough to hold them all comfortably. There is, consequently, a great deal of going and coming on the airlines.

The saving of time over surface transport is very great, and in the summer, at least, the air is by far the most pleasant way of travelling. Weather conditions in the winter are not bad from the pilot's point of view by comparison with some European countries. Snow is the principal obstacle, but temperatures are fairly even, and in most of Spain fogs or extensive storm-clouds are not frequent.

It is certain that after the war is over air transport will continue to make rapid strides in Spain. Though the main roads are good, the route mileage of railway is very low. There is not nearly enough rolling stock and the trains are crowded and slow. Spain is the most mountainous country in Europe except for Switzerland, and also one of the largest. With the amount of passenger and freight transport that the reorganisation and development of Spain will necessitate, it seems probable that it will soon possess one of the most extensive and busy air networks in the world.

A.S.

Guild Prizes

AT their meeting last week the Court of the Guild of Air Pilots awarded two of the annual prizes which are offered by them.

The Reliability Trophy for the year 1937-38 went to Wrightways, Ltd., for their work in operating and maintaining an early morning newspaper service between London and Paris in all kinds of weather. The donation of £10 for an annual scholarship, presented by the Air League to the Guild, went to Mr. A. M. D. Howes, who obtained the highest number of marks in the Second Class Navigators' Examinations held during the twelve months ended June 30.

Palestine Airways Service

THE new Near East passenger service from Tel Aviv, the all-Jewish Mediterranean city, has now been inaugurated by Palestine Airways, Ltd., using the new Tel Aviv aerodrome. The service will connect Tel Aviv with Haifa daily, and with Beirut three times weekly. A special taxi service will bring passengers to Tel Aviv from Jerusalem, which is 40 miles distant. The 400-metre runway of the aerodrome carries the name " Tel Aviv " in both English and Hebrew.

This new service is especially appropriate at the present time, owing to the danger of travelling by road and rail in the Holy Land. It is operated with a Short Scion Junior.

ENSIGN, the first of the imposing new class for Imperial Airways, arrived at Croydon last week. That worthy veteran *Scylla* can be glimpsed in the background.

HERE and THERE

Paris Aero Show Postponed

OWING to delays caused by the recent crisis it has been decided to postpone the Paris Aero Show one week. Consequently, the exhibition will be held from November 25 to December 11, instead of opening on November 18.

Prohibition Over Europe

TWO new prohibited zones have recently been created around Vienna and Budapest respectively. Only two corridors in the first place and one in the second are available by which machines in regular service may approach Aspern and Budaors Airports. Details of the zones and of the corridors may be obtained from the Automobile Association, the Royal Aero Club, Stanfords, or the Civil Aviation Information Bureau of the Air Ministry.

C.A.G. at Grimsby

THE registration, on September 30, of a company under the title of Grimsby Aviation, Ltd., foreshadows the inauguration of a C.A.G. training centre, to be operated by those moving spirits in the Herts and Essex Club, the Frogley Brothers and Mr. F. E. Darlow.

They are already operating a Reserve school at the Grimsby Corporation's airport at Waltham, and the new scheme has received the sanction of the C.A.G. Commissioners. In all probability a club will also be formed.

Still More Expansion

A NEW aircraft factory at Gloucester, to be managed by the Gloster Aircraft Co. and costing over £1,000,000, and extensions to the Fairey factory at Stockport costing £500,000, have been approved by the Air Ministry. The announcement was made by Sir Kingsley Wood at the opening of the new Cambridge Aerodrome last Saturday.

Presumably the first-named factory will adjoin the existing large Gloster works at Hucclecote, which was considerably extended a couple of years ago. The output of Fairy Battles from the Stockport works is already on a large scale.

N.P.L. Directorship

PROFESSOR R. H. FOWLER, O.B.E., F.R.S., who was to have assumed the directorship of the National Physical Laboratory on October 1 in succession to Dr. W. L. Bragg, O.B.E., D.Sc., has been released from the engagement for reasons of health.

To the vacancy thus created, Dr. C. G. Darwin, M.C., Sc.D., F.R.S., Master of Christ's College, Cambridge, has been appointed. Until Dr. Darwin can assume his duties the office of director will be filled by Sir Frank Smith, K.C.B., C.B.E., Sec.R.S., the Secretary of the Department of Scientific and Industrial Research. Correspondence should be addressed, as hitherto, to the Director, National Physical Laboratory, Teddington, Middlesex.

Cardiff Criticises C.A.G.

THE Cardiff Aeroplane Club, feeling that clubs are being penalised by certain aspects of the C.A.G. scheme, has circularised other clubs with a letter, of which the following is a copy:—

"With the inauguration of the Civil Air Guard Scheme, there seems to us a general endeavour to impose on clubs unreasonable demands for additional payments.

"The scheme was, in our opinion, designed to assist light aeroplane clubs, which for years past have only just been able to struggle along, and in many cases, were it not for financial assistance and voluntary service rendered by enthusiasts, a number of the clubs would have gone out of existence.

"Apart from necessary increases in staff wages, etc., we have received demands for additional payments from:—

(1) Insurance underwriters.

(2) The Aerodrome Owners Association.

(3) The General Council of Associated Light Aeroplane Clubs.

"We give our comments in the same order as above:—

"(1) We consider the arrangement made between the General Council of Associated Light Aeroplane Clubs and the underwriters to be on an entirely wrong basis. Whilst it is admitted that there must be an increase in flying hours consequent upon the operation of the Civil Air Guard Scheme, we feel that it would have been more satisfactory and equitable for the premiums on machines to be slightly increased rather than a levy of 5 per cent. on subsidy earned. We suggest that a scheme could be evolved on a mutual co-operative basis whereby all aircraft belonging to light aeroplane clubs could be insured collectively, possibly excluding third-party risks, which, after all, involve a comparatively small premium.

"(2) You will, no doubt, have heard that there is an endeavour by the Aerodrome Owners Association to place light aeroplane clubs, as regards C.A.G. landings, on the basis of terms agreed with the Air Ministry for the Reserve flying training schools. We estimate this might mean a charge of approximately £80 per annum per machine. This, again, is an endeavour to impose conditions which are inequitable and which are bound to have serious repercussions on light aeroplane clubs in the future.

"(3) An agreement has been sent us by the General Council of Associated Light Aeroplane Clubs for signature, but we consider the levy they desire to place on the moneys received from subsidy under the Civil Air Guard Scheme will yield them a sum greatly in excess of the amount that the General Council can possibly require. We feel a levy should be made only for such an amount as is actually needed. We suggest you defer signing this agreement meantime.

"We consider the foregoing matters of paramount importance to the current well-being and future of aeroplane clubs throughout the country, and perhaps you would kindly give careful consideration to these important matters and let us have your views at an early date."

(Signed) ARTHUR S. DAVIES, Secretary.

THE INDUSTRY

British Rotary Milling Cutters

IN recent years, due largely to the requirements of the aircraft industry, there has been an increasing demand for rotary milling cutters, particularly when used in conjunction with portable flexible-drive machines. This type of cutter lends itself admirably to the removal of excess metal from aluminium alloy castings before the material can be brought to the finally desired degree of finish. It is, of course, equally well suited for die work and for dressing steel, cast iron, copper, bronze, Elektron, ebonite and other substances.

Although these cutters now play such an important part in the industry, they were, until recently, the virtual monopoly of Germany and little was known in this country of their correct use. Most earlier types of rotary milling cutters had straight teeth set at unsuitable angles, while the question of correct speed was little understood.

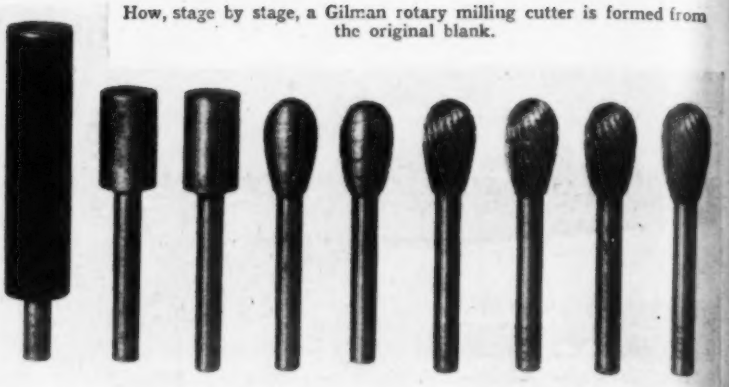
For many years the firm of F. Gilman (B.S.T.), Ltd., of 195, High Street, Smethwick, has specialised in the production of single- and multiple-speed machines with flexible drives, so it was natural that this company should become interested in the actual manufacture of the cutters and other tools used in conjunction with their machines.

After many setbacks Gilmans succeeded in producing rotary milling cutters which, it is their proud boast, bear any comparison with the German article. At their light and airy works in Smethwick production of these cutters, with their efficient teeth cut spirally around the periphery, goes on apace to fulfil orders for, it is stated, all the aero engine factories in this country, including all the shadow factories.

These all-British tools are made from tool-steel for working soft metals and materials, or high-speed steel for hard steels, nickel-chrome, etc. The rough blank is turned out on an ordinary capstan lathe, after which the shank is given a first grind to ensure accuracy during the later stages. Next, the blank is accurately shaped to very fine limits on a semi-automatic, after which it is given a spiral cut. Then the milling teeth are cut spiral-wise on automatics, the practically finished tool is stamped, numbered, hardened and the shank finally ground down to the standard size of 6 mm. diameter.

While the standard range of cutters is manufactured in one piece with the shank, which is normally 1½in. long, the firm can manufacture cutter heads of larger sizes, tapped to suit threaded arbors if required, and, in addition, most of the shapes can be supplied on special long shanks. The firm is even prepared to supply special cutter shapes for almost any class of work, provided these are ordered in reasonable quantities.

How, stage by stage, a Gilman rotary milling cutter is formed from the original blank.



"I.C.I. (Plastics) Ltd."

MOULDRITE, LTD., of Nobel House, Buckingham Gate, London S.W.1, an associated company of Imperial Chemical Industries, Ltd., is now to be known as I.C.I. (Plastics), Ltd. This step has been taken to bring the plastics group of I.C.I. into line with other manufacturing groups such as I.C.I. Metals, Ltd.

Mouldrite, Ltd., claim to manufacture and market the largest range of plastics handled by any single producer in the British Empire, and their products include moulding powders, syrups, glues, resins, etc., of the phenolic and urea formaldehyde types, and the acrylic esters, "Diakon" and "Perspex."

Aviation Developments Ltd. Progress

AT the annual general meeting of Aviation Developments, Ltd., held at the company's offices (Argyle House, Euston Road, London, N.W.1) last week, Sir Alliott Verdon-Roe, O.B.E., F.R.Ae.S. (the chairman), said that the company had had a successful year and had earned a satisfactory profit. He was glad to report that the Chobert riveting system, sponsored in England by the company, was being adopted to an increasing extent in the construction of aeroplanes of the latest design. The popularity of the system among aircraft manufacturers was undoubtedly due to the fact that it enabled riveting to be done speedily and easily.

Success had also attended the introduction to the aircraft industry of the A.V.R. riveters' sheet-gripper.

Nothing to Hyde

IN 1917 the works of Fletcher Miller, Ltd., the well-known makers of cutting and other industrial oils, consisted of one shed of 135 sq. yds. area. Now, so greatly has their business expanded that last week they moved from their Dukinfield, Cheshire, works to a fine new establishment of 24,575 sq. yds. area at Hyde, near Manchester. The postal address is Hyde, Cheshire; the telephone numbers are Hyde 781-782; and the telegraphic address is "Emulsion, Hyde."

Mercuric Equipment

SOME of the principal items of equipment on *Mercury* which contributed towards her recapture of the seaplane long-distance record (reported on pages 321-322) included: Hobson carburation, K.L.G. plugs, wooden airscrews by the Airscrew Co., Ltd., Sperry automatic pilot, Smith's instruments, Marconi radio, electrical equipment by Rotax, Lucas and D.H. Bonnella, controls by Arens, Exactor and Bowden, upholstery by Rumbold, fuel system jointings by Cork Mfg. Co., Shell fuel, and Intava oil.

Mr. Eric Mensforth Joins Westland

THE directors of Westland Aircraft, Ltd., announce that Mr. Eric Mensforth, M.A. Cantab, has been appointed a joint managing director of the company.

Mr. Mensforth was educated at University College School and King's College, Cambridge. After a period as technical engineer to Dorman Long and Co., Ltd., he became assistant general manager of the Bradford works of the English Electric Co., Ltd., and subsequently works manager of the Preston Works, leaving there in 1937 to enter the service of Markham and Co., Ltd., Chesterfield, of which company he was a local director

Ethylene Glycol

CHARACTERISTICS, handling and present and potential uses of ethylene glycol are very fully discussed in a small, well-bound book issued by the I.C.I. Dyestuffs Group.

One chapter deals with Air Ministry requirements for this notable anti-freezing agent and coolant. One of the main difficulties with high-temperature cooling systems is the corrosive effect of the coolant on various metallic parts, and the book explains how the problem has to a large extent been overcome by the use of a grade of ethylene glycol (ethylene glycol AM) containing a special corrosion inhibitor.

Responsible persons may obtain the book from Imperial Chemical House, Millbank, London, S.W.1.

Machine Tools Demonstrated

SO successful has been the exhibition and demonstration of machine tools and small tools at the showrooms of Burton Griffiths and Co., Ltd., Sparkbrook, Birmingham, that it has been decided to extend the closing date until next Saturday, October 15.

Burton Griffiths, being factors for British, Continental and American machine-tool manufacturers, are able to include in their display a wide range of machinery of a type rarely seen under one roof in this country. Considerable space is devoted to the products of B.S.A. Tools, Ltd., which include single-spindle automatic screw machines and centreless grinding machines. Other exhibits include the Landis universal grinding machine, Gisholt turret lathes, various types of milling plant, Maag gear-cutting and grinding machines and the Anderson power scraper.